

THE IRON AGE

New York, December 7, 1922

ESTABLISHED 1855

VOL. 110, No. 23

Polish Machinery Industry Shows Revival

An American Observer Finds Signs of Progress—Some Contrasts Between Conditions To-day and in 1909—Prospects for Export Trade

BY CAPTAIN GODFREY L. CARDEN

COMING out of Russia a few weeks ago, I stopped off at Warsaw to visit again those machinery works with which I had been familiar before the war. Immediately I was impressed on arrival with the clean-up of the streets and the excellent up-keep

of both public and private buildings. It was a new Warsaw, a very different city from what I had known in 1909 when the Russians were in control.

Readers of THE IRON AGE will recall Captain Carden's previous contributions to its columns dealing with the machine tool industry in Great Britain, Germany, France and other European countries, also his reports to the Department of Commerce in pre-war years when he went to Europe as its special agent to investigate machine tool developments. On his return to the United States from Russia, some weeks ago, Captain Carden re-visited Germany and in later articles he will give our readers the results of his observations there.

The Germans, I was told, had allotted to each house *concierge* the cleaning to the middle of the street of all roadway fronting his immediate premises. With two *concierges* working opposite there was never any question as to that particular portion of the street being

kept clean. Whether it was the Germans who were responsible for first cleaning up Warsaw, I do not know, but it is certain that the Polish capital is to-day as clean



Agricultural Machinery Works at Sosnowiec, Southwest of Warsaw, Poland

as most German cities were before the war, and far cleaner than many German cities of to-day.

In 1909 I had occasion as special agent for the Department of Commerce to report on the Warsaw shops of Gerlach & Pulst; Bormann, Szwede & Co.; Rohn, Zielinski & Co. and K. Rudzki & Co. The first named was a prominent machine tool works. It was comparatively new when I visited it in 1909, but before the war came it had made rapid progress, and its prospects for the future were unusually good. The German drive into Poland forced the Russians back and as the latter retreated they swept the works clean of everything. Nothing, I am informed, was left. The plant has never been restored.

Typical Machinery Plants

Both Rohn, Zielinski & Co. and Bormann, Szwede & Co. are in full swing. They are typical of the Polish machinery industry and for that reason I paid especial attention to them. In 1909 Bormann, Szwede & Co. employed as high as 1000 men. To-day the number is 450. As in previous years, this establishment turns out steam engines and engine fittings, boilers, pumps, blowers and a general line of equipment for sugar refineries and distilleries. A standard type of steam engine is built for sugar works, and the firm undertakes to construct complete installations for refineries and distilleries. The works originated as far back as 1808, but the present firm name dates from 1875. In 1909, when I went over the shops, it was with Director Maurycy Bormann. This last visit it was with his son, a man of the same charming personality as the father. It is the son who is now the active head of the business.

Competent Mechanics Scarce

The works comprise a general machine shop, copper smithy, foundry and repair shop. Sugar machinery, copper piping and boiler construction made up the bulk of the orders which I observed in hand. Mr. Bormann spoke in optimistic terms of the prospects ahead. They had all the work they could do for the present; more, in fact, and the greatest trouble was to secure competent mechanics. There was a decided tendency among Polish workmen to go to France because of the higher wages now being paid there.

All raw material used in his shops, Mr. Bormann said, came from Polish territory. This is something which was not possible before the war. Poland, it must be borne in mind, has gained important mineral territory which during the war belonged to enemy states.

For the present the orders coming in are for the most part from Latvia, Lithuania, Esthonia, and home territory. Before the war a very considerable business was carried on in southeastern Russia in sugar machinery and it was hoped that the opportunity would present itself to open up business again in Russia.

Mr. Bormann was of opinion that the dread of socialistic ideas for Poland had passed by. The Polish workman, he declared, had got beyond that stage and was now to a great extent immune.

On all sides at the Bormann, Szwede plant there was evident a gratifying snap and vim, and the sentiment was expressed to me that in due course, unless the unexpected happens, the Polish machinery industries will come back into their own.

Rohn, Zielinski & Co. Works

At the Rohn, Zielinski & Co. plant I went about with Mr. Ligarzewski, engineer over the technical department. This plant is now employing about 300 men, practically the same number as in pre-war days. Now as in former years, these shops are turning out air and circulating pumps of the Worthington type and a line of radiators. Many of the pumps in former Russian warships came from these Warsaw shops. The American Worthington pump has always been regarded as the

most serious competitor the Warsaw shops had to meet, even more so than was Gardner of England, or Schwabe of Erfurt, Germany. Prior to the war Warsaw was Russian territory and Russian duty^{*} was exacted, but according to the Warsaw viewpoint Worthington pumps from the United States had an advantage in sea freight over continental freight rates into Russia, and furthermore, owing to the comparatively light weight of the Worthington pump, the duty collected was relatively small.

Practically all raw material required by the Rohn, Zielinski shops is obtainable in Polish territory, although I believe it is still the practice to draw on outside sources for lubricators and for sleeves to cover that portion of the pistons exposed between the cylinders of high-pressure pumps.

Turning Out Machine Tools

I noted with considerable interest that the Rohn, Zielinski shops are attempting to meet some of the Polish machine tool demand by undertaking on their part to turn out engine lathes, planers and slotters. Four sizes of lathes are made, one size planer, and a Loewe type slotter.

Practically all the tools in the shop are of a pre-war age, and a lot of new equipment is demanded, but for all that this plant is going ahead and doing things, and even figuring on export just as soon, it was said, as it is possible to increase capital to a point which will permit of putting in new tools. The Slavic border states which were formerly Russian territory are regarded as a natural export field for their outputs.

When one considers that this plant passed successively from Russian to German and then back to Russian hands, and finally into Polish hands, and that both Russians and Germans undertook to carry off what they could, it is a wonder that there is anything left of the shops. However, the plant is there to-day and running, and the spirit shown is fine.

The Rohn, Zielinski works have branches in London and elsewhere, and before the war they had also a branch in Moscow.

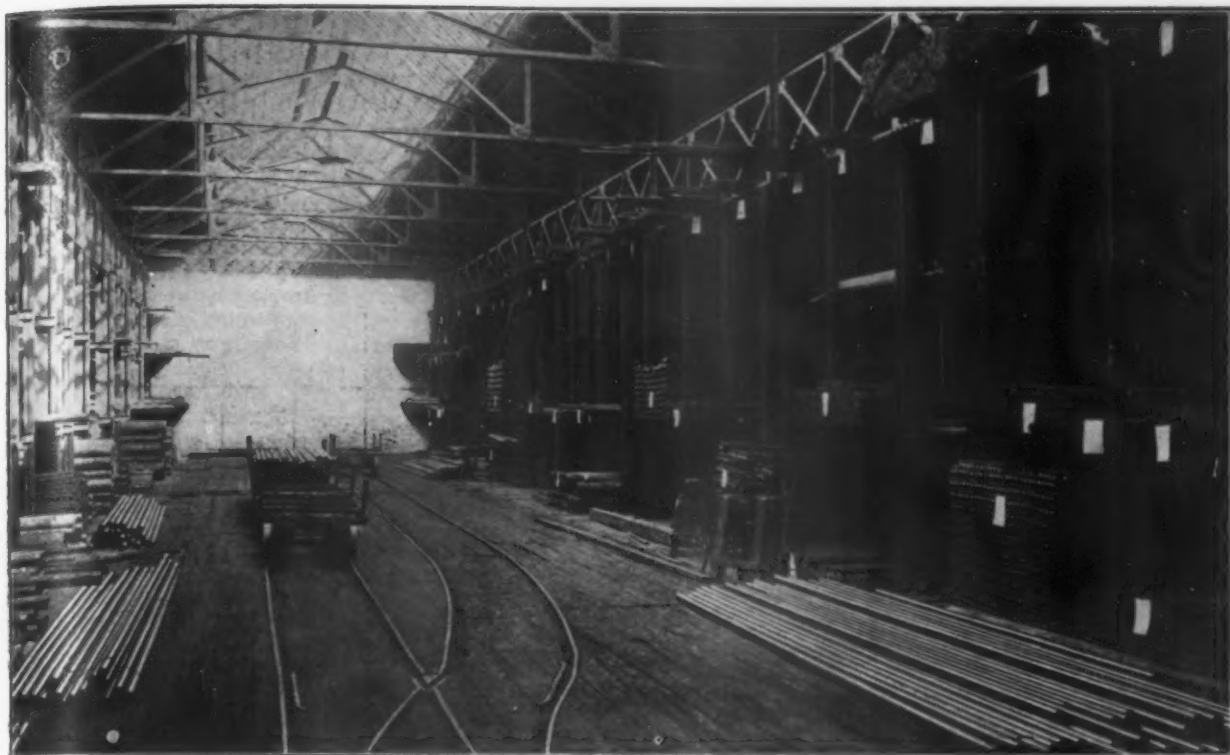
The Rudzki shops are as formerly representative of that class of works in Poland which engage in a general line of machinery. The plant comprises shops both within the city limits of Warsaw and at Nowominsk. These works undertake bridge construction, railroad frogs, complete water works for railroads and towns, and complete arrangements for gas works, heavy sluice valves and street hydrants. The railroad frog part of the business has always been an important feature of these shops.

Revival in Metal Working Lines

The consensus of opinion obtained in my talks among the machinery men was that there was a considerable revival in the manufacture of iron and steel products, which at one time had practically reached the vanishing point. At least two new plants are recorded since the cessation of the war, for machinery and locomotive building.

What has been accomplished so far has been in the face of heavy handicaps, especially so when one considers that the Germans carried away all available raw material and machinery from the industrial districts of Russian Poland. To re-establish the factories meant the securing of new equipment. I observed in this connection considerable machine tool installations secured under the reparation terms, the tools being transferred to Poland from Austrian shops.

Following the termination of the last war with the Soviet Government of Russia, the economic improvement in Poland has been a steady one. The railroad equipment replenished by rolling stock under the reparation terms from Germany has clarified the situation very much. The Polish railroad gage now corresponds to



Seamless Steel Tube Storage at Sosnowiec Works

the standard European gage. This standard gage extend right up to Stolpse on the Russian frontier.

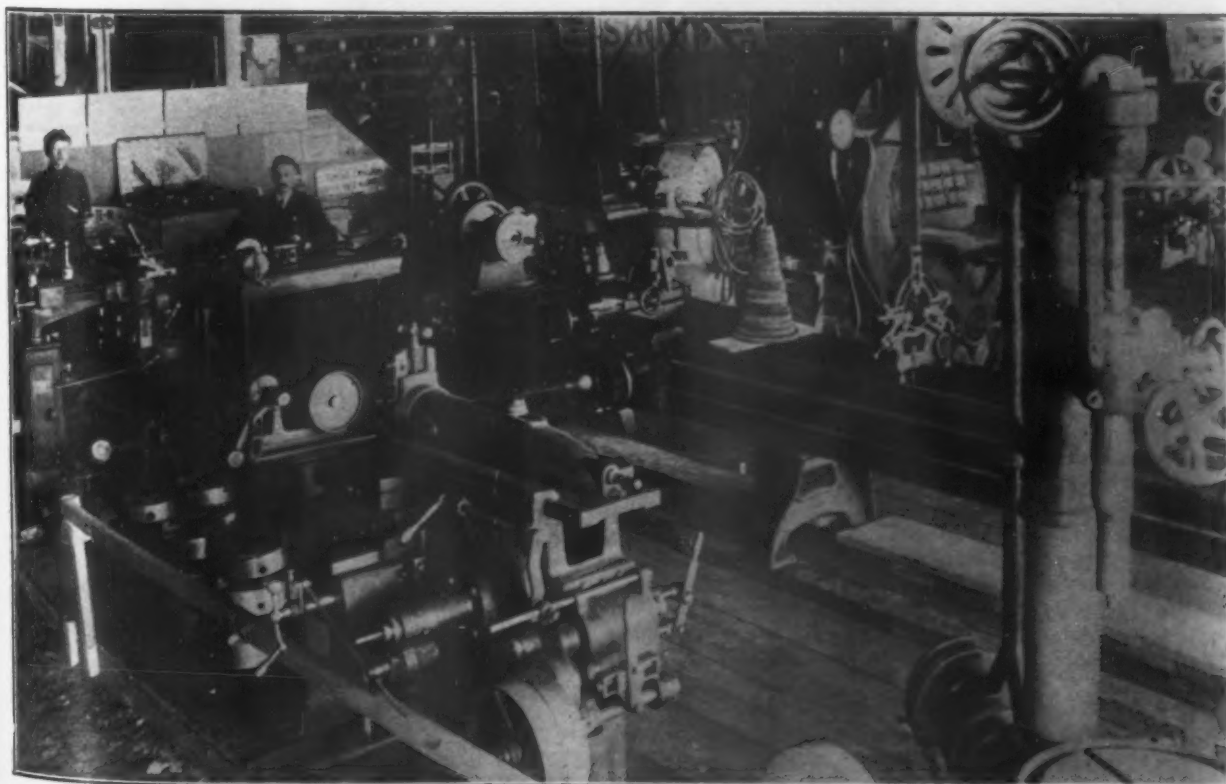
Textiles the Chief Industry

While the metal and machinery industry is important, it must not be overlooked that before the war 53 per cent of all industrial workmen were employed in the textile factories. The normal pre-war annual production in textiles, of which 60 per cent was cotton goods, totaled \$200,000,000. At Lodz alone there were employed before the war more than 100,000 textile workers.

The Polish textile mills were largely owned and managed by Poles. During the war these mills suffered.

Copper and brass parts were taken, also electric motors. So far as equipment is concerned these mills are now in shape to run on about a 65 per cent pre-war basis. The closing of the Russian market makes a serious situation for these mills, until some arrangement can be made whereby they again can serve Russian territory. At the present time the Polish textile mills are turning out about 40 per cent of pre-war outputs.

The spirit in Poland to-day is remarkably good. There always existed the elements for a strong national sentiment. Those elements have since crystallized and Poland to-day presents possibilities of marked character. The industrial future just now depends largely on the stability of the present Government.



Exhibition at First Exposition at Lwow of Jan Witwicki, of Kamienna

FACING AND CENTERING MACHINE

Double-End Semi-Automatic Production Unit for Railroad Axles and Drive Shafts

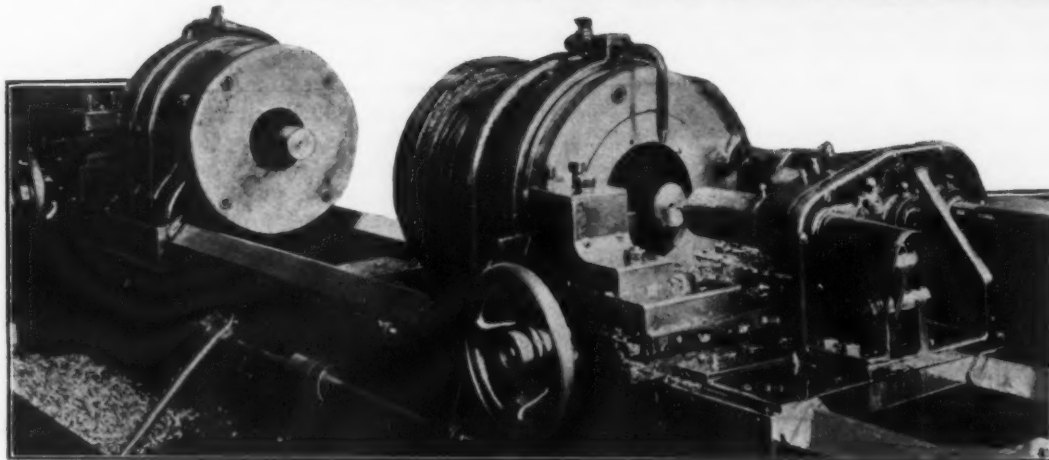
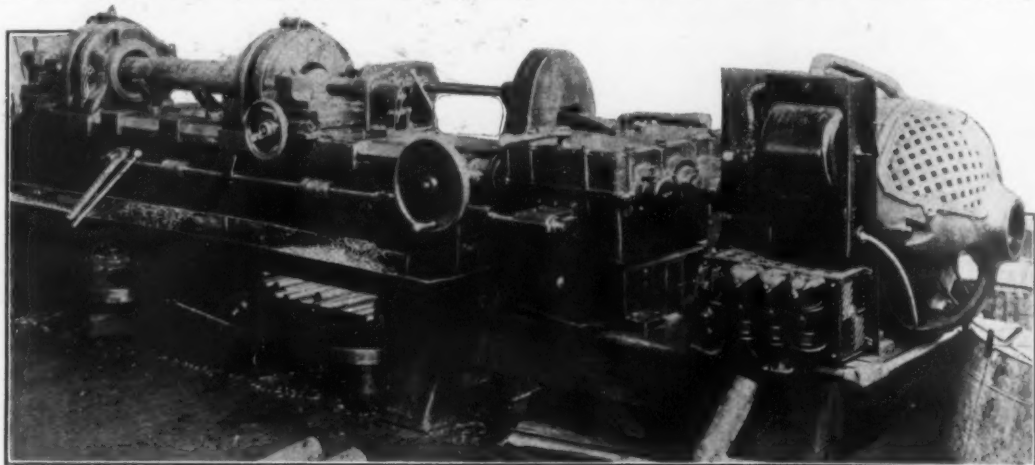
Automatic features are an outstanding characteristic of the double-end semi-automatic facing and centering machine shown in the accompanying illustrations. The equipment illustrated was originally developed by the Goodman Mfg. Co., maker of mining machinery, Chicago, for use in connection with a standard shop operation for which, it is said, there was not available a machine to do the work on a production basis.

The machine in different sizes can be used for not only large work, such as railroad axles, but also for properly preparing armature shafts, gear shafts and similar work, for subsequent turning operations on

The advantages of the machine from a production standpoint, may be noted perhaps from an outline of the set-up and sequence of operations. In setting-up for the job the first step is to adjust positions of the heads by power traverse and hand wheel, so that the cutting-off tools are spaced apart correctly for the length of the shaft to be cut. The stop on the front of the machine is then set against the head and the latter moved $\frac{3}{8}$ -in. away from the stop. The power release clamp on the left-hand side of the head is then set. Finally the heads are separated to a distance sufficient to permit the work to be dropped between and the power releasing clamp on the right-hand side of head is set.

The sequence of operations is as follows: Place the work on the V-rests between the heads, throw power-traverse lever for the heads; when head traverse throws out, turn the handwheel the remaining distance $\frac{3}{8}$ -in. against the stop. Then tighten the universal chucks;

Double - End
Semi-Automatic
Facing and
Centering Machine for Pre-
paring Railroad
Axles, Gear and
Other Shafts for
Turning Opera-
tions on Lathes
Having Multiple
Stops



The Heads Can
Be Separated
to Permit Drop-
ping the Work
Between Them.
Traverse of the
heads is by
power, and an
automatic stop
is provided. Cut-
ting-off tools
have power
cross feed with
automatic stop
and reverse.
Centering spin-
dles operate
automatically as
part of cycle of
cutting-off tools

lathes having multiple stops. For the latter class of work a uniform distance between bottoms of center holes is very essential and the machine illustrated is intended to take care of this requirement, and also to cut off and face the shaft itself to proper length at the same setting.

The heads are arranged so that they can be separated to permit dropping the work in place between them, instead of putting it through one of them. Traverse of the heads in either direction is by power, and an automatic stop is provided for either direction. The cutting-off tools have a power cross feed with an automatic stop and automatic reverse, with stop. The centering spindles are operated automatically as a part of the cycle of the cutting-off tools. The centering tools automatically traverse into position and feed into the work as the cutting-off tools are withdrawing; the centering tools have automatic stop when the proper depth is reached, and automatic reverse and stop.

Because of the automatic features mentioned one man can operate several machines, the number depending upon the length of time consumed in the machining. Other features include quick-acting universal chucks, quick-setting gage for drill spindles, quick-acting V-rests for adjusting heavy work, and a quick-change feed mechanism which provides four changes of feed.

pull the clutch handle, starting the work to revolve; and pull out the power feed knob of both heads. The cutting-off and centering tools then automatically perform their functions, return to the predetermined position and stop. The machine is then stopped by pushing the clutch handle, the chucks are opened and the power traverse lever thrown in reverse, whereupon the heads traverse apart to the automatic stops, and the operator removes the work.

Some of the principal dimensions of the machine are: swing over the ways, 19 in.; swing over the tool slide, 7 in.; and diameter of the hole in the chuck, 7 in. The maximum distance, heads apart is $5\frac{1}{2}$ ft.; the maximum distance between cutting tools, heads apart, 7 ft. 8 in. and the minimum distance between cutting tools, heads together, 2 ft. 2 in. The shortest piece that can be faced and centered, using double chucks is $13\frac{1}{4}$ in. The length of the bed is 10 ft. $8\frac{3}{4}$ in. and the width of the shears, center of Vee, is $13\frac{1}{2}$ in. The floor space occupied by the machine is approximately 3x16 ft. A variable speed, 10 hp. 250 to 1000 r.p.m. motor is used.

On a drive shaft $21\frac{1}{4}$ in. long and $2\frac{1}{4}$ in. in diameter, the time claimed for facing and centering is 4 min. On an axle 60 in. long and $5\frac{1}{2}$ in. in diameter the time claimed is 15 min., from floor to floor.

Efficiency of Electric Power Supply*

Improvement Depends Upon Making the Best Use of Existing Facilities and Choosing Carefully the Source of Power

BY CHARLES P. STEINMETZ†

POWER production is an industrial operation, just like the making of steel rails or of furniture, or the running of a railroad or a hotel. The high efficiency of modern industrialism is essentially due to the subdivision of industrial operation so that every industrial operation is carried on in a separate plant by a separate organization such as to secure the maximum possible economy for each particular operation, whether the making of steel rails or the running of a hotel.** However, the plant and organization most efficient for one industrial operation, such as the making of structural steel or the running of a railroad, cannot be most efficient for another and entirely different operation, such as the production of the power which is needed as raw material in the principal industrial operation. Thus best economy requires the separation of power production from the industry served by it.

This was not possible so long as there were no means of transporting or transmitting and distributing the power. It became possible by the development of electrical engineering, and thereby a new industry has been developed, the industry of electric power production, transmission and distribution, co-ordinate with the older industries, such as those of making steel rails or running a railroad. This made it possible to segregate the power production from the industry using the power as raw material, and thereby to secure maximum economy in both.

Increasingly since then industrial electric power supply from a general electrical power system has taken the place of the local industrial steam or electric power generating plant, and that not merely where a small or moderate amount of power is involved, but even with such large powers as the operation of a metropolitan rapid transit system or trunk line railway electrification.

With this the efficiency of the electric power industry has become of importance to all industries, and to the public at large.

An important factor in industrial economy is the cheapness of the raw material. The principal raw material of the electric power industry is energy; hydraulic energy, of the water powers, and fuel energy of coal, gas, oil, etc. Thus the development of the country's water power is of interest not only to the corporation exploiting the water power, but to all industries and the public at large.

The raw material of an industry is cheapest when it can be secured as the by-product of another industry, though generally it is not safe for an industry to entirely depend on a by-product as a source of raw material, due to its limitations. Energy, the raw material of the electric power industry, is a by-product of many other industries, for instance, the steel industries, in the blast furnace gases, etc.

Thus we get the general conclusions:

- 1.—Power production has become a separate industry.
- 2.—It is more economical for an industry to secure power from the electric power industry than to produce its own power.
- 3.—Economy requires that by-product power of an

*Abstract of a paper presented at the sixteenth annual convention, Association of Iron and Steel Electrical Engineers, Cleveland.

†Chief consulting engineer, General Electric Co., Schenectady, N. Y.

**This does not necessarily mean a separate corporation but often, and increasingly so, a number of industrial operations are controlled by the same corporation, but then best economy usually leads to separate technical and administrative organizations for each industrial operation.

industry be not wasted, even partly, but be used to its fullest extent as raw material for power.

Electric Energy Cannot Be Stored

It is characteristic of electric energy that it cannot be economically stored (in the quantities and under the conditions considered here). Therefore it must be used at the rate at which it is produced. Thus, if the load is not constant, the station cannot be full loaded all the time, and the more the load varies, the less is the station output compared with the output which the station could give at uniform load, and the higher therefore the cost of power. This makes the cost of electric power dependent on the load curve, that is, the variation of the load throughout the day and throughout the year, and on the load factor, that is, the ratio of the total (daily or annual) load on the station, to its capacity.

With a daily load curve as given by Fig. 1 (winter lighting load), of load factor 0.33, the station gives only 33 per cent of the output which it could give if continuously carrying its maximum load. With an annual load distribution as given by Fig. 2, the load exceeds 150,000 kw. for 8 hr. only. The additional apparatus required to take care of these additional 30,000 kw. of annual peak load makes the power during the 8 hr. of the peak cost more than \$1 per kw-hr., while the average cost throughout the year may be a fraction of a cent per kw-hr.

With the station load curve Fig. 2, an additional amount of kw-hr. larger than the total kw-hr. now sold by the station could be supplied without any additional investment, if limited to the off-peak period, and the only additional cost due to this amount of off-peak energy would be that of fuel and some attendance, etc. And as the fixed cost usually is the major—and with water power almost the entire—cost of the power, the cost of off-peak power therefore should be lower still than that of continuous power, while that of peak power is much higher. Off-peak power is somewhat of the nature of a by-product, in many respects; its cost is low, but if developed beyond the limit, it ceases to be off-peak power and becomes peak power.

The size of the generating, transmitting, converting and distributing plant, and practically every other element entering into the cost of electric power, except fuel and size of prime mover, are determined by the kva. delivered by the station, while the power is measured by the kw. The cost of power per kw. thus essentially depends on the ratio of kw. to kva., that is, the power factor of the load.

Thus the lower the power factor the higher the cost, and the higher therefore should be the price of the power. For instance, if the total cost of power, exclusive of fuel, and the fixed charges due to the mechanical part of the generating plant, constituted the fraction q of the cost of power, at power factor p , Q kw. would

represent $\frac{Q}{p}$ kva. apparent power, thus $(\frac{Q}{p} - Q)$ kw. additional generator and line capacity, costing as much as $q(\frac{Q}{p} - Q)$ additional kw. of power, and the cost

of power at power factor p thus would be $Q + q(\frac{Q}{p} - Q)$

$$= (1 - q + \frac{q}{p})Q$$
, that is, would be increased by the factor $1 + \frac{q}{p}(1 - p)$.

Thus, considering as standard the cost of power at

unity power factor and continuous load, the cost increases with increasing power factor, and it increases with increasing fluctuation of load, that is, with increasing ratio of maximum to average load or, as explained, with maximum demand factor, as seen above. This really is not strictly true, but it depends upon whether the maximum demand overlaps with the station peak or not.

Methods of Power Supply

There are three ways of supplying power to an industry:

First is the isolated local plant without connection with any electric power system. The advantages and disadvantages of this arrangement have been discussed in the preceding. Where considerable energy is available as a by-product of the industry, the cost of power from a local isolated plant may figure lower than power can possibly be bought from the central station. This, however, may have little meaning, as it depends on the value assumed for the by-product energy used as fuel by the local plant. If the by-product energy is not sufficient for the total power demands of the industry,

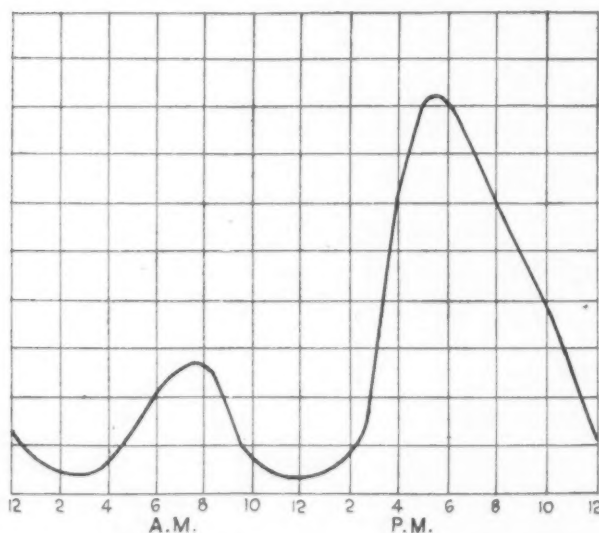


Fig. 1. Winter Lighting Load of a Central Power Station

additional fuel has to be used; where there is more by-product energy than required to produce the power, the surplus may be wasted, or an attempt made to find some other use for it. Or it may also be converted into electric power and some of the electric power sold. Or some industrial uses for the surplus electric power may be developed, such as electric smelting or refining. The latter probably is the most economical arrangement.

Secondly, the electric power required by the industry may all be bought from an electric power system, and no local plant operated. This is most convenient, but depends on the rates which can be secured from the electric power company. In general, the power would be bought in bulk under a rate based on maximum demand and on power factor. It would therefore be economically desirable to arrange the industrial operation so as to have as nearly uniform power consumption as possible, without large peaks of power consumption, so as to have the maximum demand exceed the average demand as little as possible, and thereby get the best rates. For power, synchronous motors would be used as far as possible, and operated over-excited so as to compensate for the lagging currents of induction motors.

Power factor corrective devices, such as synchronous condensers, may be installed in the substation. The substation with its transforming, regulating, power factor controlling devices, etc., may be owned and operated by the power company, or by the industrial corporation, or it may be owned by the one and operated by the other. The power may be metered on the primary side of the substation or on the secondary side. The general economic principle, I believe, should be that everything pertaining to power generation, transmis-

sion, transformation, control, etc., should be operated and preferably also owned by the power supply company, as being a legitimate part of the electric power industry; while everything pertaining to the application of the power to the specific industry served by the substation should be operated by the industrial corporation. The specific arrangement which can be made will, however, to some extent depend on the financial strength, on the progressiveness of the management and the far-sightedness of the engineering staffs of the two companies.

If there is considerable by-product energy, some arrangement should be made to utilize fully this available energy. If the by-product energy is wasted entirely by not being used, or wasted intrinsically by being put to an inferior use, for heating only, instead of first taking out the available mechanical power, then the arrangement is uneconomical, even if financially the central station power supply should figure out an advantage.

Where a daily or annual peak is a factor in the cost of central station power generation, and off-peak power therefore of lower cost than continuous power, lower rates may be secured if the plant operation can be organized so as to disconnect the central station supply for a few hours during the day, and operate on local power only. Or a two-rate metering may be arranged, that is, a lower meter rate during the off-peak period. This would allow the use of central station power during peak load, if so required by the industry, but put a premium on avoiding it and securing the lower rate of the off-peak power.

A third way of operation would be to carry constant load on the local station, and take the fluctuations by the central station service. In this case a less favorable price for central station power would result, but the local station would work at best economy. With by-product energy, the local station may then be operated at such output as to consume the by-product energy at the rate at which it is produced, and eliminate the need of storage.

Economy in Use of Power

The most economical arrangement between local station and central station power supply to a large extent depends on local conditions of power demand and

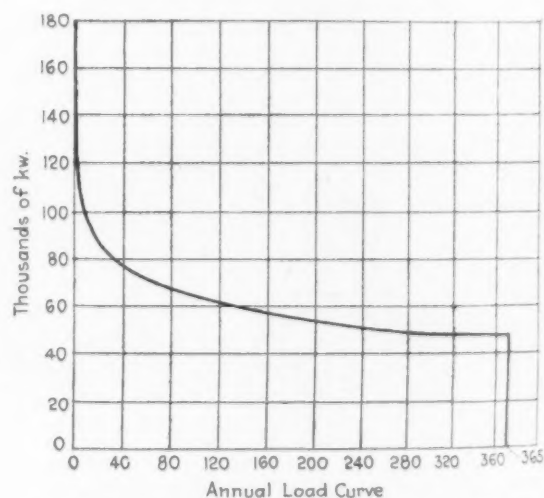


Fig. 2. Annual Load Distribution of a Central Power Station, Showing How Small Is the Total Use of the Highest Station Capacity

supply, and on the possibility of modifying the power demand to get more favorable conditions, and is deeply involved in the matter of rate making. While the economic principle of rate making is to arrange the price in proportion to the cost of power, as depending on quantity and quality (such as load factor and power factor, peak and off-peak), the actual rates may not quite represent this, and the lowest rate may not always be the most economical.

The fundamental principle of operation of an electric power system [as of any other] is to get as much output as possible out of the most economical stations

and call upon the less economical stations only after the more economical ones are fully loaded. That is, in a system comprising several steam stations, during times of light load only the most economical stations would be kept running, and with increasing load less economical stations started, so that the least efficient stations (usually the small, old stations) or machines in the station (for what applies to the different stations, equally applies to the different machines in the same stations) may be operated only a few times during the year, or in emergencies due to accidents to some of the more efficient machinery.

Where hydraulic stations and steam stations operate in the same system, the hydraulic stations would be operated at continuous full load, and the variations of the load taken by the steam stations, since the efficiency of power production of the hydraulic station decreases with decreasing load much faster than that of a steam station, as in the hydraulic station practically the total

cost is fixed cost; in the steam station a part of it proportionate cost. Obviously, if there is water storage, and a season when the total water supply is less than needed to operate the hydraulic station continuously at full load, it would be most economical to shut it down during periods of light load on the system and carry full load during the peak load of the system.

A local station utilizing by-product energy would have to some extent the same characteristic as a hydraulic station: low proportionate cost of power, due to cheap energy. Compared with the huge main station of the electric power system, it probably will be less economical, and thereby also have somewhat the characteristics of secondary stations. The former would favor continuous full load operation, the latter shut down during light load on the system, and the most economical method of operation therefore would have to be worked out on the basis of the cost of power production under different circumstances.

THE SPEED OF THE DOLLAR

Small Profits Many Times Over Make Large Totals in the Year

BY JOHN J. RALPH

WHAT was last year's turn-over? The turn-over of total capital? The turn-over of live capital? For six years, in metal working lines, it has hardly been necessary to ask this. This year it will be because the reward is not so easily earned, nor is it limited solely by what one's conscience allows him to take!

Each turn-over is a purchase. If your purchases have been right then you can sell and re-purchase. Each time there is a turn-over there should be a profit. The faster the turn-over, the bigger the trip profit, at the same price, because the less the proportion the dollar carries each time for permanent and long time purchase load—another name for fixed overhead.

To what extent is the idea of profit "Buy low and sell high"? Does it appear that one must get his costs out of each thing sold? Why? Was it felt necessary to get no more than mere

costs for the past six years?

Has each one looked to see what purchases he can make that will speed the dollar on the round trip? Is there an ingredient finer than that now used which will improve the product and speed the dollar gait, so that even if it does not bring in so much each trip it can travel oftener and at the end of the year have brought back a sizable total?

The retailer is learning that lesson, poorly and slowly, to be sure. The jobber is doing better. Their magazines are full of the story. But has the manufacturer learned it? His literature is full of scientific management—technical processes—efficiency engineering, but to the merchant has been left the slogan, "Cut your losses, take your profits, and repeat."

The manufacturer is, first of all, a merchant. As such it is his business to make a profit, and to make this profit on his ability as a merchant. He is a manu-

facturer because, as a merchant, that seemed to him the path of most successful merchandizing. Some think that because of the manufacturing he is entitled to a profit. Not at all. The profit is the result of his ability as a merchandizer.

Electric Truck and Portable Elevator

The Baker R & L Co., Cleveland, has added to its line of industrial trucks and tractors the combined electric truck and portable elevator, designated as the Hy-Lift, shown in the accompanying illustration. It is designed to carry material and also to raise it, placing the loads directly on drays or in freight cars from the ground, tiering packages and unloading into the upper tiers of bins. Other uses include the placing of heavy dies in punch presses and carrying them to and from the storeroom. Closed automobile bodies may be loaded into box cars in two tiers, and for this use the truck has been fitted with a turn-table arrangement intended to permit putting the body directly into place without being touched by hand.

The truck is rated to hoist a two-ton load from the

floor to a height of 6 ft., a cable hoist being employed. The machine consists of an electrically-driven truck mounting two vertical I-beam members which act as a track for the lifting carriage. The latter runs on four steel wheels and carries the



Combined Electric Truck and Portable Elevator. Loads may be placed directly on drays or in freight cars, from the ground. Other uses include placing of heavy dies in punch presses and transporting them to and from the store room

load platform which is hinged to it. The hoist is of the two-drum type, with electric motor drive through a 40 to 1 worm reduction. An automatic limit switch opens the power circuit at the limits of travel and the load is held in position by means of a solenoid brake. The controller for this mechanism is conveniently mounted adjacent to the driver's platform.

The Wisconsin Southern Railroad Co., C. D. Smith, Fond du Lac, Wis., president, has announced that construction work will be started by April 1 on 50 miles of a proposed 250-mile steam railroad line, standard gage, single track, between Madison and Sturgeon Bay, Wis., by way of Fond du Lac and Manitowoc. The cost is estimated at \$2,600,000. The corporation was organized in Wisconsin in 1892 with an authorized capitalization of \$5,000,000.

NEW INDUSTRIAL LEADERSHIP

Engineer-Business Type the Country's Salvation, According to Dean Kimball

A mind capable of high development along business and financial lines, while yet retaining in its background the powerful scientific methods of attacking problems which have made modern industry possible, is the great contribution that the engineer can bring to the problem of universal well-being, said Dexter S. Kimball, dean of the Colleges of Engineering, Cornell University, in his presidential address before the American Society of Mechanical Engineers, New York, Dec. 4. "The one great thing we are all seeking is *justice*; but there is no justice where there is no knowledge, and the engineer, again using this term in its widest sense, alone possesses an accurate and intimate knowledge of industry."

"No one would presume to say that the engineer alone can solve the industrial riddle," he went on to say, "but it is clear that he can make a very great contribution to the solution. The National Department of Education has for some time been advocating strongly that engineering students be taught more of the fundamentals of business and that young men preparing for the

field of business and commerce be instructed in some of the outstanding features of engineering. And it may be that we shall yet develop a combination of these two fields that will produce the new type of industrial leader. But whether the new leadership comes from one field or the other, or from a combination of the two, the problem of universal well-being offers a challenge and a call to duty that the engineer may not refuse."

Early in his address Professor Kimball emphasized that wide application of the principles of mass production has been made possible by mass financing, the work of the financier. The engineer, in turn, is now developing the principles of mass management, and his contributions to the philosophy of management are already noteworthy. "I believe," he said, "most business men would be surprised to know to what a large extent the methods of the engineer have invaded their chosen field, and there can be little doubt that the near future will see the engineering type of manager a predominant figure in all industrial administration."

All first-class engineering colleges, he added, now prescribe more or less economic study and students of engineering recognize this study as a necessary part of their mental equipment.

The address was well received, Secretary Rice remarking that so far as his memory went it was the first time a presidential address received an encore as evidenced by the prolonged applause.

Cincinnati Selected for Triple Supply Convention

Advance announcement has been made of another triple convention of the National Supply & Machinery Dealers' Association, the Southern Supply & Machinery Dealers Association and the American Supply & Machinery Manufacturers Association, to be held in Cincinnati, May 17, 18 and 19, 1923, with headquarters for all three Associations at the Hotel Sinton.

Employment in Cleveland

Employment of labor in Cleveland during November increased 1.9 per cent according to the monthly report of the Cleveland Chamber of Commerce and the State-City Employment Bureau, which compiled these figures from reports of 100 companies employing 500 or more persons. On Nov. 30, these companies employed 86,384 persons as compared with 84,796 on Oct. 31, and with 61,423 during July, when the low point was reached. Employees of iron and steel plants and manufacturers of iron and steel products increased 3.2 per cent during the month and there was a gain of 4.70 per cent in employment in plants making metal products other than iron and steel. The seasonal slump in the automotive industry resulted in a decline of 4 per cent in employees in plants making automobiles and automobile parts.

The Charles A. Coffin Foundation Is Announced

President Gerard Swope, General Electric Co., makes the following announcement:

"On May 16, 1922, Charles A. Coffin in his 78th year retired from the active leadership of the General Electric Co. Mr. Coffin has been identified with the development of the electrical industry since 1882. He was the founder of the General Electric Co., of which he has been the inspiration and leader for 30 years.

"As an expression of appreciation of Mr. Coffin's great work, not only for the General Electric Co., but also for the entire electrical industry, and with the desire to make this appreciation as enduring and constructive as Mr. Coffin's life and work have been, the board of directors of the company created on his retirement, and now desires to announce the Charles A. Coffin Foundation."

The income from a \$400,000 fund set aside for the foundation, amounting to approximately \$20,000 a year, will be available for encouraging and rewarding service in the electrical field by giving prizes to its employees, recognition to lighting, power, and railway companies for improvement in service to the public, and fellowships to graduate students and funds for research work in technical schools and colleges.

The foundation will be administered by a committee appointed by the board, which committee will have power to change the conditions of the distribution of the fund and the amounts for each particular purpose.

Charles A. Follett, who has been active in steel circles for nearly 20 years, during eight of which he was identified with the Phoenix Tube Co., Brooklyn, N. Y., has joined interests with G. M. Wheeler, formerly for eight years vice-president and general manager of the Newark Tube & Metal Works, Newark, N. J., to organize the Lincoln Steel Co., with offices at 120 Liberty Street, New York. Mr. Wheeler was also at one time connected with the Phoenix Tube Co.

Henry Ford is carrying on diamond drill exploration in the Michigamme valley west of Channing, Mich. The first hole has reached a depth of 300 ft. This is a continuation of the exploration work as started by John M. Longyear many years ago and carried on later by the Chicago, Milwaukee & St. Paul railway, and the Oliver Iron Mining Co. Experts always have contended that some day a high grade body of iron ore would be discovered in the Michigamme valley.

COMING MEETINGS

December

American Society of Mechanical Engineers. Dec. 4 to 8, inclusive. Annual meeting, Engineering Societies Building, 29 West Thirty-ninth Street, New York. Calvin W. Rice, secretary.

National Exposition of Power and Mechanical Engineering. Dec. 7 to 13, inclusive. Grand Central Palace.

January

American Engineering Council. Jan. 11 and 12. Annual meeting, headquarters of Federated American Engineering Societies, 24 Jackson Place, Washington. L. W. Wallace, 24 Jackson Place, Washington, N. W., secretary.

CRANE OF UNUSUAL PROPORTIONS

American Bridge Crane in Holland Has Long Apron

Unique in that it has an apron longer than the bridge span, a bridge crane for handling ore and coal has recently been erected by the Brown Hoisting Machinery Co., Cleveland, for the Coal Trading Association, Rotterdam, Holland. This crane is also of interest because the builder had to meet keen German competition, but was able to convince the buyer that the American crane was superior to the types offered at considerably lower prices by German manufacturers. Several cranes for similar work, all of German make, had previously been installed by the Rotterdam com-

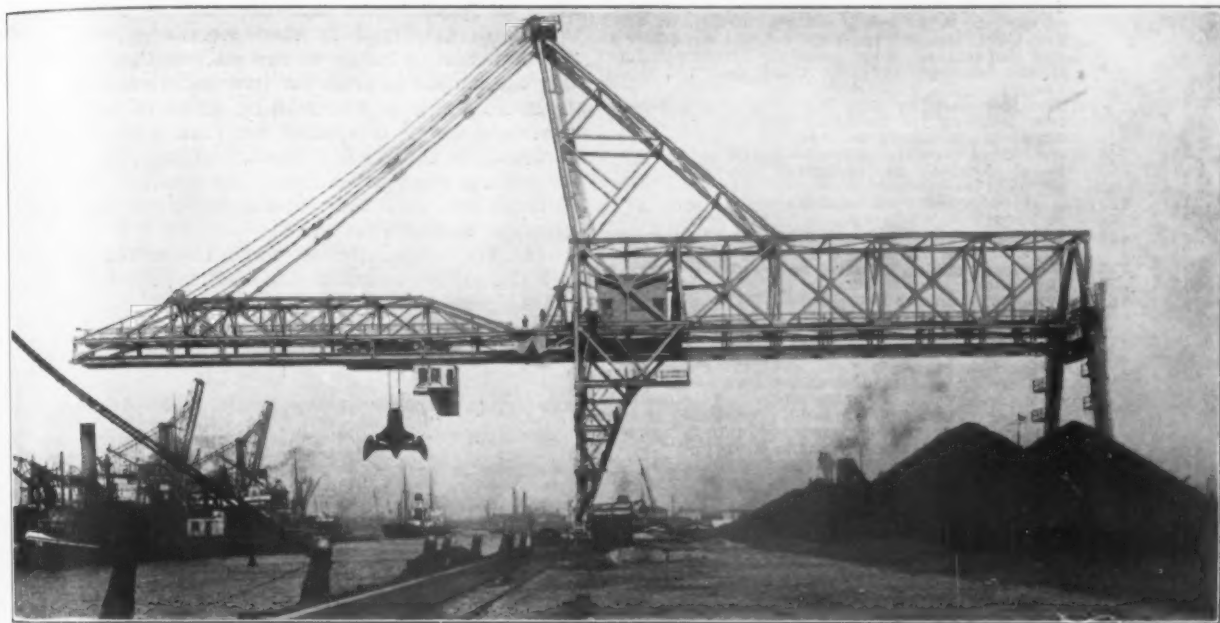
pany, two of these appearing at the left in the picture. After the first American crane had been operated a short time, an order was placed for a duplicate installation. The crane is designed for transferring foreign ores from steamers of 2000 to 10,000 tons capacity to barges up to 3600 tons capacity, that carry it from Rotterdam up to the blast furnaces and steel plants along the Rhine and Ruhr Rivers, and for unloading coal brought down the Rhine in the same barges on their return trip. The coal is transferred to steamships, mostly for shipment to France. A peculiar situation has developed from the war reparation terms in that Germany, after making her required shipments to France, has not enough coal to supply her domestic demands, and buys fuel from England to supply the deficiency. Consequently, coal laden barges are running both ways on the Rhine, those coming down carrying German coal for France, and some upbound carrying English coal for German industries.

In handling ore the cargo-laden steamship is tied up to the dock and, as a rule, two barges are tied alongside the ship, bringing the three vessels side by side. The reason for loading two barges at a time is that, while the crane is dumping ore into the hatch of one, the other is being shifted enough lengthwise to bring the compartment to be next loaded into line with the bucket. This permits the continuous operation of the bridge. The method of transfer explains the need of the long apron. This is hinged 14 ft. from the front bridge legs, so that it can be raised to clear the masts of the steamship when the bridge is being moved on its track. The apron rods, connected in 36-ft. sections, are folded up when the apron is raised. The apron is raised by twelve strands of $\frac{3}{4}$ -in. wire rope.

The bridge span is 155 ft. 8 in. long and it is 161 ft.

from the bridge rail to the end of the apron. The bridge is equipped with two interchangeable 10-ton buckets—a clam shell bucket for coal, and a bucket for handling the Swedish and Spanish lump ores. The bucket is operated by a man-riding trolley equipped with two independent drums each driven by a 175-hp. motor. The bucket is provided with a motor-driven table for rotating. The trolley is driven by a 105-hp. motor, and motors of the same capacity are used for raising the apron and for propelling the bridge. The propelling motor is located in a motor house above the pier legs, power being transmitted to the wheels through shafting and gears.

The bridge has a capacity of handling 500 to 600 tons of ore, or 600 to 700 tons of coal, per hour. Storage space is provided under the bridge, to be used



With Enough Overhang to Reach Two Barges Tied up Outside a Steamship, This Crane Is Enabled to Trans-ship Coal with Unusual Speed from Barge to Ship, or Vice Versa

in case boats are not available for trans-shipping cargoes.

Rapid Wage Advances in German Metal-Working and Building Trades

The rapid rise in the cost of living in Germany in the past summer was accompanied by greater increases in money wages than in any period of equal length. As compared with pre-war rates, wage rates as fixed by the latest collective agreements are for skilled workers between 53 and 57 times, and for unskilled workers between 62 and 76 times those of 1914, according to information received by the International Labor Office in Geneva, Switzerland. The following table gives the weekly money wages of 1914 and the latest quotation as well as the percentage of increases for some of the workers:

Metal Workers			
	July, 1914	Latest Figure, 1922	Per Cent Increase
General Average:	Marks	Marks	
Skilled workers.....	37.57	1905	5070
Semi-skilled workers.....	33.49	1836	5480
Unskilled workers.....	25.04	1795	7170
Berlin:			
Skilled workers.....	42.44	1962	4620
Semi-skilled workers.....	39.96	1874	4690
Unskilled workers.....	30.62	1830	5980
Building Trades			
	July, 1914	Latest Figure, 1922	Per Cent Increase
General Average:	Marks	Marks	
Skilled workers.....	37.56	2041	5430
Unskilled workers.....	29.11	1816	6240
Berlin:			
Skilled workers.....	43.46	2088	4800
Unskilled workers.....	29.15	1984	6805

Temperatures at Which

Fusion, Melting and Vaporization of Substances—Table of Temperatures and Users of

BY HENRY

Degree
Temperature
Cent. Fahr.

—40 —40

0 32

100 212

120 248

150 302

204 399

220 428

290 554

292 558

350 662

400 752

420 788

444.5 832

475 887

480 896

580 1076

655 1211

675 1247

680 1256

700 1292

750 1382

774 1425

800 1472

Steel containing 25 per cent nickel, which is non-magnetic because of having been heated, is made magnetic; that is, it will be attracted by a magnet.

Iron and steel have higher tensility and lower ductility than at higher temperatures up to 100 deg. Cent.

Water boils. Least tensility of steel below red heat (Howard, French). Greatest contraction of area of boiler steel below red heat (French). When steel containing 0.95 per cent of carbon is hardened and drawn at 100 deg. Cent. it has the least degree of solubility in 1 per cent sulphuric acid (H_2SO_4) (Heyn and Bauer). When the same steel is dissolved in acid the greatest proportion of the carbon is evolved as gaseous hydrocarbons. Sheffield drill rod, having presumably about 1 per cent of carbon, when hardened and drawn at 100 deg. Cent., has least specific magnetism (Barns and Strouhal). Steel loses its sonority when struck between 100 deg. Cent. and 150 deg. (Law).

The low tensility and high ductility indicate this temperature as being the best for cold-drawing operations on steel.

Seasoning steel to increase ductility. Least ductility of Yorkshire iron rods. (7.5 per cent).

Least ductility of manufactured iron (12 per cent).

Faintest visible straw color in tempering eutectic steel having 0.9 per cent carbon.

Greatest tensility of steel and wrought iron.

Blue color given to eutectic steel in tempering.

When soft steel (0.07 per cent C) is quenched and reheated at 350 deg. Cent. it has the greatest degree of solubility in 1 per cent sulphuric acid. Nickel becomes non-magnetic.

When hypereutectic steel, containing 0.95 per cent carbon, is quenched and drawn at 400 deg. Cent. it has the greatest degree of solubility in 1 per cent sulphuric acid. The steel is by that treatment wholly converted into troostite.

Zinc melts. Useful for calibrating.

Boiling point of sulphur (for calibrating).

Lowest visible red of iron in pitch darkness (Howe).

Greatest strength of cast gun iron. (Howard).

High nickel steel containing 25 per cent nickel becomes non-magnetic.

Aluminum melts.

Point Ar. 1 of all steels containing carbon.

Mercury boils.

Lowest temperature for annealing eutectic steel containing 0.9 per cent carbon.

Point Ar. 2 in cooling steel with not more than 0.45 per cent carbon. Iron becomes non-magnetic.

Quenching temperature of chromium steel balls having $\frac{1}{2}$ in. diameter.

Sodium chloride (common salt) melts.

THE temperatures listed below are chiefly those relating in some way to the production and heat treatment of steel or to the fusibility of steel and of its components. The higher temperatures, that is, those of vaporization and dissociation of compound substances employed in steel metallurgy, are mostly unknown, and so far as we can see now they would have only a scientific interest for iron and steel men.

In speaking of the melting point of a substance, either element or compound, one must understand what is meant, as there are a number of temperatures near the melting point which bear some relation to it. Some of these are practically useful and some have only a scientific value. These are:

(1) The temperature at which the substance sinters, as a clay. This is useful. It is below the fusion point, No. 4.

Degree
Temperature
Cent. Fahr.

802 1475

850 1562

890 1634

900 1652

900 1652

930 1706

960 1760

1060 1940

1083 1981

1100 2012

Quenching temperature of chromium steel balls of over $\frac{1}{2}$ in. diameter.

Grain made finer in annealing steel containing 0.27 per cent carbon and 0.88 per cent manganese. Phosphorus a maximum. Specific heat (of 0.1657) of iron occurs (Harker).

Point Ar. 3 of pure iron.

Highest temperature for annealing softest steel containing not over 0.10 per cent carbon.

Critical temperature at which softest ingot iron (Armco) is redshot when rolled.

Lowest temperature for case-hardening (900 to 1000 deg.).

Low limit of temperature for forging steel for cannon.

Silver melts.

Quenching temperature for manganese steel.

Copper melts. Used as sentinel pyrometers for heating manganese steel for quenching before real pyrometers were available.

Lowest fusion point of cast iron.

OPPOSE RADICAL BILL

Manufacturers, Navy and Army Strongly Object to Socialistic Measure

WASHINGTON, Dec. 5.—Socialistic and revolutionary, the Hull bill providing for exclusive manufacture by the Government of military and naval supplies is not expected to be reported out by the House Committee on Naval Affairs, which is holding hearings on the measure. At the same time, it has attracted considerable attention from the business world because of the principles involved. The trend toward radical legislation, and which may be expected to be emphasized much more after March 4, next, also is an element in the interest shown in the Hull bill and is an example of what organized labor is seeking in the way of legislation.

The measure, as might be expected, is supported by the American Federation of Labor, but is vigorously opposed not only by the business interests of the country but by the War and Navy departments. The attitude of the business interests was explained to the committee by James A. Emery, counsel for the National Association of Manufacturers, who appeared before the committee last Wednesday and to-day as a representative of that association, the National Metal Trades Association, the National Founders' Association and the State Association of Manufacturers. He was accompanied by representative manufacturers in many lines, including the foundry trade. Memoranda from both Navy and War departments have been sent to the committee

in opposition to the bill, and the views expressed by these departments and those expressed by Mr. Emery have undoubtedly made a strong impression on the committee.

Fundamentally Objectionable

Mr. Emery said that the bill is fundamentally objectionable because on the broadest scale, it puts the Government into the business of general manufacture in competition with its own citizens and under conditions of unfair competition. He declared that the proposal is impracticable and could operate upon the scale suggested only at great expense to the Government. He added that it "involves a continuing fraud upon the public in the form of an arbitrarily determined cost of production which eliminates actual elements of cost and leaves the determination of these to the discretion of an irresponsible official."

Mr. Emery added in part:

A Revolutionary Proposal

"The Hull bill is a revolutionary proposal, originating in the metal trades department of the American Federation of Labor. It is intended not only to prevent any lessening of the number of employees in the Navy yards and arsenals but to multiply their number. This is to be accomplished by requiring the Government to manufacture exclusively every requirement of the Army and Navy, from warships to clothing. In addition, the arsenals and navy yards, by direction of their department heads, or at the request of any other department or bureau, are directed to submit competent bids for

Physical Changes Occur

Temperatures for Producers of Metals and Other and Steel

BERARD

(2) The highest temperature at which a vessel made of the substance can be used. Instance a porcelain crucible. This is useful. It is lower than No. 1.

(3) The temperature at which it softens in any degree which, as in a firebrick, limits its usefulness. This is useful. It is lower than the fusion point, No. 4.

(4) The temperature at which its edges are rounded. This is often called the fusion point and is generally the one given in the table. It has only a scientific value.

(5) The temperature at which it becomes fluid. Instance a slag. This is interesting, but taken alone is not useful. It is above No. 4.

(6) The lowest temperature at which it may be handled molten in practice, as a slag or metal in a metallurgical operation. This is useful. The temperature may be 50 or 100 deg. Cent. (90 to 180 deg. Fahr.) above No. 5 as the substance leaves the furnace.

Degree Temperature

Cent.	Fahr.	
1115	2039	Cobalt becomes non-magnetic.
1120	2048	Magnesium boils.
1170	2138	Fusion point of the more fusible acid open-hearth steel slags.
1177	2150	Forging or rolling temperature for high speed steel.
1200	2192	Burning temperature of clay firebrick.
1204	2200	Temperature for quenching high speed steel tools. (Bethlehem.)
1210	2216	For rolling rail steel.
1250	2282	Ferrate of calcium ($\text{CaO Fe}_2\text{O}_3$) melts. Highest melting point of cast iron.
1251	2284	Ferrous silicide (Fe_2Si) melts.
1255	2291	Manganese melts.
1296	2365	Temperature for quenching high-speed steel tools (Arnold).
1325	2417	Fusion point of manganese steel (13 per cent manganese).
1344	2451	Complete fusion of iron containing 0.89 per cent carbon.
1350	2462	Lowest fusion point of simple steels. (1350 to 1400 deg. Cent.)

Degree Temperature

Cent.	Fahr.	
1360	2480	Sulphate of calcium melts and decomposes.
1378	2512	Fluoride of calcium melts.
1400	2552	Burning temperature for silica bricks.
1419	2586	Ferrous oxide (FeO) melts.
1420	2588	Wrought iron welds.
		Burning temperature for magnesia bricks (1400 to 1450 deg. Cent.)
		Silicon melts.
1443	2629	Ferric silicide (FeSi) melts.
1450	2642	Molding sands melt (1450 to 1740 deg.).
1452	2646	Nickel melts.
1470	2678	Silicate of manganese (MnSiO_3) melts. (1470 to 1500 deg.)
1490	2714	Cobalt melts.
1500	2732	Silicon volatilizes (Whitney).
		Silicate of iron (FeSiO_3) melts (1500 to 1550 deg.).
1512	2754	Silicate of calcium (CaSiO_3) melts.
1520	2768	Casting temperature of crucible tool steel.
1525	2777	Chromium melts.
		Lead boils.
		Highest fusion point of steel.
1530	2786	Iron melts.
1538	2800	Fe_3O_4 melts.
1548	2818	Fe_2O_3 melts.
1550	2822	Lowest operating temperature of open-hearth furnaces and Bessemer converters.
1560	2840	Fireclay bricks melt (1560 to 1725 deg.).
1565	2849	Silicate of magnesium (MgSiO_3) melts.
		Bauxite bricks melt (1565 to 1785 deg.).
1650	3000	Highest operating temperature of open-hearth furnaces and Bessemer converters.
1670	3020	Tridymite melts.
1700	3092	Silica bricks melt (1700 to 1750 deg.).
		Titanic acid (TiO_2) melts.
1710	3110	Cristobalite melts.
1740	3164	Koalin melts.
1750	3182	Pure silica melts.
1755	3191	Platinum melts.
1795	3263	Titanium melts.
1820	3308	Bauxite melts.
1900	3452	Manganese boils.
2050	3722	Chromite bricks melt.
		Pure alumina melts.
2059	3738	Chromic oxide (Cr_2O_3) melts.
2165	3929	Magnesia bricks melt.
2180	3956	Chromite melts.
2200	3992	Chromium boils.
		Silicon boils.
		Aluminum boils.
		Graphite made from amorphous carbon. (2200 to 2400 deg.)
2220	4028	Carborundum decomposes without melting.
2450	4442	Iron boils.
2500	4532	Zirconium oxide melts.
2550	4622	Molybdenum melts.
2572	4662	Lime (CaO) melts.
2750	4982	Vanadium carbide melts.
2800	5072	Magnesia (MgO) melts.
3176	5750	Tungsten melts.
3600	6512	Molybdenum boils.
3700	6692	Carbon is vaporized.
5200	9392	Tungsten is vaporized.

every form of Government supply in competition with private producers."

The War Department memorandum sent by Secretary Weeks points out that in peace times it is necessary to hold at arsenals a nucleus of skilled workers, capable of quick expansion, to meet emergencies, but that the arsenals are not equipped with facilities for commercial production on any extensive scale.

"It has been the policy of the Government to encourage private concerns by giving them war supply contracts in peace times so that when quantity production is needed urgently, these concerns can adjust themselves to Government demands without loss of time in tuning up," the Secretary wrote.

The Navy Department memorandum likewise makes out a strong case against the bill. For instance, it is pointed out that to take out of the hands of the Secretary of the Navy the control of all work to be done at the navy yards, which would be a result of the bill, would tie his hands in such a way that "the purpose of his executive office would be seriously impaired and his responsibilities could not be met."

In summing up its objections, the Navy says: "In general, the object of the bill appears to convert all Navy yards and plants of the Navy in peace time into general factories for everything used by the Government, regardless of whether or not such plants are particularly fitted for such manufacture. It seems to be a case of any kind of work at any time and at any cost, totally oblivious of the purposes for which such Government plants were established. Whether or not the fleet would suffer and the naval forces be crippled, is

dismissed from consideration. The fact is ignored that, in time of war such Government plants would be devoted to that war material which commercial plants could not supply in sufficient quantities, and that under the provisions of this act, the peace time work of these Government plants would be devoted in a great measure to doing that very work which on the very first sign of war, would be called for from the commercial world."

Contract for Virginian Railroad Coal Handling Plant

The Virginian Railroad has placed a contract with the Alliance Machine Co., Alliance, Ohio, for what is said will be the largest coal handling plant in the world, which will be erected at Norfolk, Va. The plant including the pier and superstructure involves an expenditure of approximately \$3,500,000. Of this, over \$1,000,000 will represent the cost of the handling plant. The plant will include two car dumpers, each handling two cars tandem at a time, two movable loading towers and four 130-ton transfer cars. The dumpers will have a capacity for handling coal cars of 120 ton capacity. The plant will be entirely electrically operated and will require 42 motors ranging from small sizes up to 450 hp. Each dumper will be operated by two 450-hp. motors. The plant will have a maximum capacity of 5000 tons per hr. It will require approximately 3700 tons of steel including several hundred tons of castings, and in addition steel trestles will require 6000 tons of steel. The contract for trestles was recently placed with the Bethlehem Steel Co.

Casting Steel Ingots Centrifugally

Results from Using a Horizontal Bottle-Neck Mold— Comparison with Earlier Attempts—Excellence of Ingots and Their Cost

BY L. CAMMEN

NUMEROUS attempts have been made to cast ingots centrifugally, beginning with the work of Sir Henry Bessemer. Some have succeeded in producing small ingots of unusually good structure but at an excessive cost in labor. No one has been able in the past to make large ingots centrifugally at a cost which could profitably compete with the current practice in ingot casting.

Some Early Processes

The following schemes have been tried in the past. The French works of the Commeny-Fourchambault



Fig. 1.—An Unsuccessful Scheme for Casting Ingots and Gears Centrifugally. The small ingots lie between the partition lugs

Co. in the late seventies of the last century tried casting Bessemer ingots for rail rolling in molds disposed somewhat like spokes in a wheel, pouring the metal through what would correspond to a hub. With short stubby ingots excellent results were achieved, but when an attempt was made to produce large ingots, the metal was unsatisfactory and the process was abandoned.

Sebenius in Sweden tried to make ingots in molds which were suspended on hooks from a cross, rotatably held on a vertical shaft. The metal was teemed into the molds while they were stationary and then the cross was set into rotation. Owing to centrifugal force, the molds flew out until they assumed a nearly horizontal position.

The metal was, of course, subjected to powerful centrifugal action, and excellent results were obtained on small ingots, the construction being obviously unsuitable to the manufacture of large ingots. After the death of Sebenius the process was discontinued.

At least two tool steel companies in this country, within the knowledge of the writer, tried to make centrifugally cast ingots by casting them in the shape of a doughnut or ring. The process was entirely unsuccessful. Before spreading out to the rim of the mold, the molten metal came in contact with the large mass of cold metal in the mold corresponding to the hollow of the doughnut, and chilled to such an extent that the ingots were full of cold shots. Furthermore, the ingots suffered from a peculiar pipe formation, taking the form of a series of cavities, from $1/16$ to $1/4$ in. wide, located about $1/8$ to $1/4$ in. under the skin of the ingot along the inner face (i.e., the face of the ring bordering on the inner hollow).

It is easy to explain how these cavities originated. The inner face of the ingot was in contact with the central part of the mold (the ingots were 4 in. by 4 in. by 24 in.), which was relatively cold, and contained a large amount of metal as compared with the metal in the ingot. Because of this, this inner face of the ingot chilled very rapidly, more rapidly, in fact, than the

inside core of the ingot, and when this latter began to cool and contract, there was no free molten metal to feed into the contraction cavities, and pipes resulted. The action of the centrifugal force not only did not prevent the formation of this kind of pipe, but rather assisted it.

The last scheme is shown in Fig. 1. It is at least 30 years old and has been repeatedly and unsuccessfully tried both for the casting of ingots and for casting spur gears. A little analysis will show why it does not work. The metal is supplied to the mold while it is spinning, and as it hits the projections 36, it is scattered into a fine spray. Such a spray chills with surprising rapidity, and falls back in the form of shot which is usually not remelted by the metal at the bottom of the mold, but is incorporated as such into the ingots or gears making them worthless.

The Bottle-Neck Mold

It is therefore merely a question of supplying the metal to the mold in such a way that it should fill the interspaces between the lugs 36 without scattering, and this has been solved by the addition of the "bottle-neck" shown in Fig. 2. Here the spout (of the same type as used in all Cammen installations) projecting into the mold for a distance of about 4 in., is placed not in the center of the cylindrical part of the bottle-neck, but inside it, about 1 in. above its lower edge, the length of the cylindrical part of the bottle-neck being about 8 to 10 in. only.

Under the action of the centrifugal force, the metal is propelled along the longitudinal axis of the mold, and slides down into the conical part of the bottle-neck, passing thus finally into the spaces between the lugs. If the lugs have properly shaped ends, there need be no washing and splashing of metal, and the

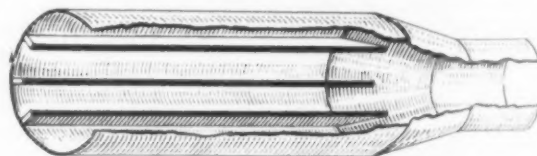


Fig. 2.—The Cammen "Bottle-Neck" Mold for Centrifugally Casting Ingots and Plate

latter flows between them with perfect smoothness. The idea of the bottle-neck addition to the mold (covered by patent applications) is of course very simple, and yet this is what makes all the difference between failure and success in this process.

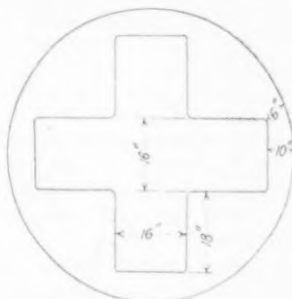
The process is handled as follows: The metal teemed into the mold should be fairly cool, and poured at as slow rate as the ingot sizes and the chemistry of the steel permit. Thus, for 16-in. ingots, a $1\frac{1}{4}$ -in. nozzle should be used, pouring at the rate of, say, $1\frac{1}{2}$ tons per min. Each mold should contain four ingot divisions, as shown in Fig. 3. The mold is started about half a minute before the teeming, so that by the time the metal begins to come in it should have attained its proper speed. The matter of control of speed is very important, and will be discussed separately at some other time.

The spinning is continued for some time after the

end of the pouring, in fact until the metal has solidified to such an extent that the ingot can be taken out. This time may vary from 3 min. for a 4 in. by 4 in. ingot to 10 min. for a 16 in. ingot. The front head (i.e., the head at the end opposite to that at which the metal is poured) is, by the way, supplied with a large opening, 8 in. in a 16 in. ingot mold, which permits one to observe the metal during the teeming, and to regulate its flow accordingly, and also to see when the metal is ready to pull from the mold.

Experience has shown that it is not necessary to provide protection against metal being thrown from this window, as this never takes place. The lugs are so shaped that the solid ingot frees itself automatically as soon as the rotation of the machine is stopped,

Fig. 3.—Cross Section of Mold Centrifugally Casting Four 16-In. Steel Ingots. The "bottle-neck" is not shown



and a special device called a "spider" is provided to permit easy withdrawal of the ingot, which is done by a hydraulic puller or by compressed air.

In view of the high centrifugal stresses, cast iron cannot be used for the molds and steel must be employed. Experience has shown that ordinary steel is not suitable, and a comparatively cheap alloy has been found which gives excellent results. The molds are cast in halves, with the split along the lug, so as to leave no fin on the ingot. They should be cast with a chill against the inner face, to prevent blowholes under the surface which would rapidly burn into cavities and produce roughness on the face of the ingot. The inside surface is then planed smooth, and it is even believed that it will pay to finish it to mirror-like smoothness by inexpensive lapping. It is believed from various data that the life of the mold will be at least 2500 castings (the amount of castings actually made is not sufficient to give reliable data as to the life of the mold). The mold will then have at least 75 per cent of its value as scrap.

The cost of making ingots by the centrifugal casting process is as follows for 16 in. ingots. The machine costs about \$10,000, and a mold about \$10,000 also. In addition to the gang at the ladle, two men can handle a machine, and roughly one casting can be made every 30 min. (say 9 tons). The cost is therefore:

Mold	\$1.60
Labor (2 men for 30 min.)	0.70
Power (100 hp. for 30 min.)	0.50
Varia	0.50
Total, 9 tons	\$3.30
Per ton	0.367

This does not include overhead, royalties, etc., but these are not much different from similar items in the case of stationary ingot casting.

Metallurgy of Centrifugal Ingot Casting

From a metallurgical point of view, centrifugal ingot casting is radically different from ingot casting in stationary molds. In the first place, a centrifugally cast ingot is "cast on the side," the metal spreading along the dimension that in a stationary ingot corresponds to its height. Furthermore, as four ingots are being cast at the same time, each partition-mold gets only one-fourth of the metal delivered from the ladle

in a given time. Say, for example, that we are casting 16-in. ingots, and that 1000 lb. of metal have been poured from the ladle in about 20 seconds. This is about as slow as metal can be conveniently teemed in commercial work. A stationary 16-in. ingot mold would be filled to a depth of about 15 in. In centrifugal casting, this metal is divided between four molds, each getting about 250 lb., and as the ingots are poured "on a side," this produces a layer only about 1 in. deep.

Therein lies the whole secret of the superiority of centrifugally cast ingots over the common variety. By the end of the teeming period of the first 20 seconds, an inch layer of steel as compared with one of 15 in.! Of course, the cooling proceeds at an immensely faster rate in the former than in the latter case, and both pipe formation is prevented and dendritism retarded. This latter feature will be better shown in another article giving sulphur prints and photomicrographs of centrifugally cast ingots.

In itself centrifugal force does not appear to have any material influence on the structure of the metal, and all talk about "fluid pressure" affecting the grain of the steel cast seems to be without foundation in fact. It is the rate of cooling of the metal that does the job, and it does not matter how this rate of cooling is obtained provided it is there. Centrifugal force is merely a cheap and convenient way to spread the metal so as to produce the desired rate of cooling, but exactly the same results would have been obtained if the same rate of cooling were produced by some other means.

There was apprehension at first that in centrifugal casting there would be excessive cracking of the surface. Experience has shown that this is not the case, and the most likely explanation of this freedom from cracking is the fact that the casting is made "on the side," and that the metal is supplied at such a slow rate that there is at no time a heavy weight of liquid metal pressing against a comparatively thin ingot wall, as is the case in ingots cast in stationary molds. In centrifugal casting, the metal is spread in a very thin sheet over a large area, and it is easy to show by a simple mathematical calculation that its pressure on the ingot walls is extremely slight, even when assisted by the action of the centrifugal force.

Another reason for freedom from external cracking may be found in the fact that the weight of the mold, as compared with that of the casting, is from two to two and a half times greater than in stationary ingot molds. Of course, the primary reason for making the mold so heavy is to give it sufficient mechanical strength to withstand centrifugal stresses, but indirectly it affects the rise of temperature in the mold and keeps it from drawing away from the casting to the same extent as it does in stationary castings.

From an operating point of view centrifugal ingot casting must rate very high. Absence of hot tops, necessity for handling the molds, stripping, etc., makes it superior even to top-pouring, and there can be no comparison when bottom pouring is considered. At the same time it should be remembered that the art is only in its infancy, and it is not recommended to attempt to cast ingots in sizes larger than 16 in.

There is another factor that must be emphasized in the strongest possible way, and that is, that centrifugal ingot casting is not a cure-all. It will help make a good ingot from good steel, a better ingot, in fact, than can be made otherwise, but it will not make a good ingot from dirty or poorly melted steel.

Surprise may be expressed that results as important as those described above could have been obtained by such simple means as the addition of the "bottle-neck" to the old and familiar mold for centrifugal casting of gears. This has been, however, the story in many of the most important inventions that have in the past revolutionized the steel industry. All of

them can be told in half a dozen words. What, after all, is the Bessemer process but blowing air through molten steel; the Thomas-Gilchrist process, but the use of a special lining in a converter, etc.? Only things that are simple and give results can survive in the steel industry, and the simplicity of the process or machine is therefore its best recommendation. In fact,

quite often the simpler the mechanism, the more difficult it is to invent it.

An article at an early date will give sulphur prints of centrifugally cast ingots, photomicrographs taken at various cross-sections of the ingot, and will explain why centrifugally cast ingots are practically free from dendritic structure.

Heavy Type 60-In. Swing Lathe

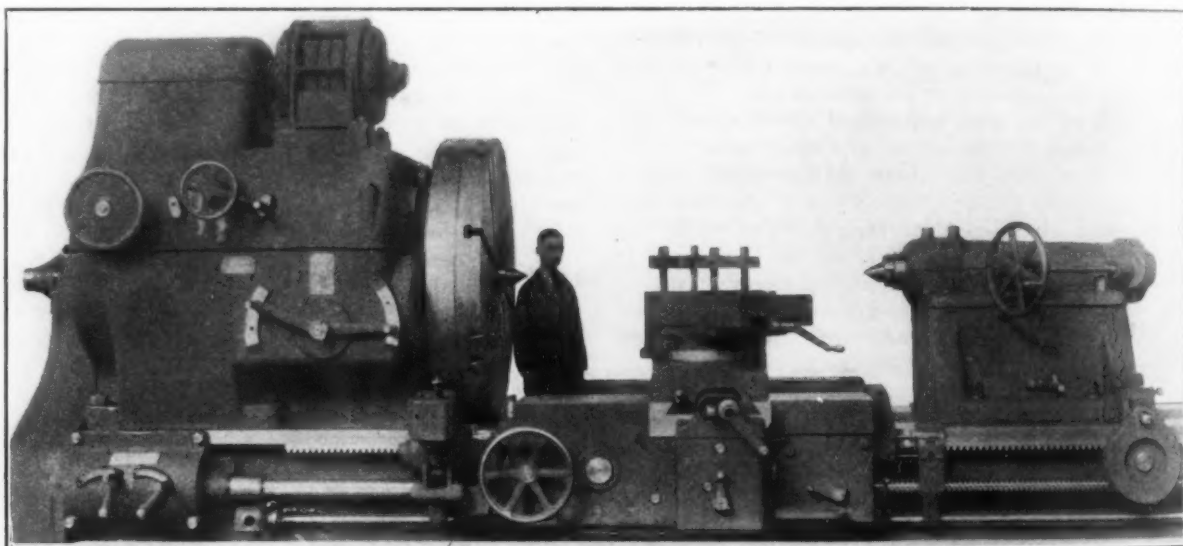
A 60-in. swing lathe of heavy type, shown in the accompanying illustration, has been built recently at its Pond works, Plainfield, N. J., by the Niles-Bement-Pond Co., 111 Broadway, New York.

The machine shown is fitted with a constant-speed motor of 40 hp. and has 24 faceplate speeds through change gears, which are operated by levers on the headstock. When an adjustable-speed direct current motor can be used, the speed range of the motor permits the omission of the geared-speed changes in the head above the joint line, without reducing the range of faceplate speeds. For either alternating or direct current motor drives a handle mounted on the carriage may be used for starting or stopping the motor, and when the lathe is driven by a d.c. motor any faceplate speed within range of the motor may be obtained by the same handle.

When moving the tailstock on the bed, the adjustment of the tail spindle is not changed. In addition to large bolts which clamp the tailstock to the bed, a tail brace pawl is provided which engages a ratchet in the bed and prevents slipping of the tailstock under heavy end thrust. The pawl may be lifted out of the ratchet by means of the handle on the front of the tailstock. The ratchet is in sections and is removable to permit cleaning out of chips which may accumulate in the bed.

The tool carriage has lateral, cross and angular power and hand feeds. It also has rapid traverse along the bed by means of a 5 hp. and drum switch with spring return to off position, mounted on the carriage. The tool slide is of the full width of the bridge and has clamping bolts and straps for securing the cutting tools. Large micrometer collars are fitted on the crossfeed screws.

The carriage apron is of one piece, inclosing the



Heavy Duty 60-In. Swing Engine Lathe. The drive motor of the machine shown is of the constant speed type, 40 hp. Twenty-four face plate speeds are obtainable through change gears

A push button on the headstock may be used for "jogging" the driving motor to permit quick and easy shifting of the speed change gears.

The headstock is entirely inclosed. Bearings and gears are lubricated continuously by means of a pump which supplies filtered oil to a reservoir in the upper part of head, from which it is piped to each place requiring lubrication. Surplus oil drains into a settling tank in the base of the head and is pumped through a filter back to the reservoir. The faceplate spindle bearings, which are unusually large, are fitted with oil distributing rings and large oil wells in addition to the continuous oil supply.

Four pairs of parallel slots are provided in the faceplate for attachment of heavy steel faceplate jaws. The centers are of tool steel, hardened and ground, and are fitted with spanner nuts for easy extraction. The tail spindle is of ample diameter for stiffness when run out, and the tailstock has increased diameter near the center. The tail spindle adjustment is by gearing and a hand wheel conveniently located. Double clamping bolts for securing in position when set are provided for the tail spindle.

For use in turning slight tapers the upper portion of the tailstock has a cross adjustment by screw. It is clamped to the lower section by bolts which are independent of the bolts that clamp the tailstock to the bed.

gearing; and shafts have bearings at each end. Gears and bearings are oiled from one reservoir which is filled from the top of the carriage. The direction of any feed may be changed and started or stopped at the carriage. Operating levers are located conveniently and interlocked so that neither two feeds, nor a feed and thread cutting can be engaged simultaneously. Feeds are obtained from a spline in the leadscrew, the thread of the leadscrew being used only for the thread cutting. The feeds or threads are obtained through a quick-change gear box which gives four changes without removing the gears, other feeds or threads being obtained by change gears provided at the end of the headstock. Gears and bearings in the feed box are amply lubricated from a tank provided.

On lathes with long beds the leadscrew and controller shaft are supported at intervals by bearings which are automatically spaced by the carriage. A steady rest, having five jaws with screw adjustment and large wearing surfaces, is included.

Figures prepared by the American Bureau of Shipping as of Nov. 1, show that on that date the sea-going steel tonnage, building and contracted for, totaled 170,390 gross tons against 156,890 on Sept. 1. Ships now being built are for coastwise or Great Lakes service, hence protected from foreign competition by law.

A Review of Steel Mill Electrification*

Ability of Motors to Take Heavy Overloads Important— Efficiency, Flexibility, Durability and Low Operating Costs Noted

BY B. G. LAMME† AND W. SYKES‡

INSTEAD of many steam engines scattered through steel mills, with boiler plants here and there to supply such engines, central power plants have grown up and electric motors have replaced the engines. With such developments have come more exact knowledge of power consumption, increased economies, greater convenience, greater reliability, and higher speeds with greatly increased production—for the electric motor is particularly well adapted for higher speed work.

One of the limitations of the older methods of individual drive was that the power behind each unit was represented by the power capacity of the unit itself. With the electric drive, on the contrary, the power behind each unit is more or less equivalent to the capacity of the generating plant itself, and in emergencies this great power may be relied upon to help out. True, there may be disadvantages in this, for with the entire power plant behind the individual machine, the equipment must be made stronger or there may be disastrous breakages. But when such situations are recognized and prepared for, then the full benefits of the big power plant are recognized.

Pulling the Load

Operating men naturally are inclined to rate or rank power apparatus according to its emergency or abnormal capabilities, rather than its normal or average operation. Everybody expects apparatus to do its normal service and, therefore, this attracts little attention. Under extreme conditions, however, one type of apparatus may vastly exceed another in its capabilities and here is where electrical apparatus, as a rule, makes a very good showing, for usually its emergency capacity is far beyond its normal rating. Unlike other apparatus, its normal capacity is not fixed by its ability to "pull the load," but by its heating characteristics. With the heating limits disregarded, which is usually the case in extreme emergency, then the apparatus, having the whole generating plant behind it, can pull enormously higher loads, but not infrequently with resulting damage to itself. In other words, electrical apparatus usually does not "lie down" under extreme conditions (as the steam engine, for example, is liable to do) but continues to pull the load that is put on it, although it may put itself "out of business" through overheating.

Tendency to Overload Equipment

This has been one of the difficulties in electric railroad operation. Operating men, until they obtain proper knowledge, usually through experience, often want to load electrical equipment until it tends to "lie down" or "stall," just as with the steam locomotive. Usually the pulling capacity of the electric locomotive is far beyond its heating capacity, and here was a frequent source of trouble in the early days of operation of electric railroads. In any other kind of service, where the maximum load conditions may be more or less fixed, the danger is not so pronounced. But the above illustrates one of the characteristics of the electric drive, in that the peak capacity may be enormous compared with any other type of drive, for the electric

motor is simply a transmitter or transformer of power, and not a power generator within itself.

High Electric Efficiency

The great advantages of the electric system as a whole would sufficiently outweigh any very considerable disadvantages in efficiency, if such existed. On the contrary, however, the efficiency of the electrical apparatus as a whole ranks materially higher than that of any other type of power supplying devices. Take the electric transformer, for instance, which might be called the heart of the alternating current system, for it is this which gives the system its voltage flexibility. Here the efficiency reaches 98 to 99 per cent under normal load conditions. The efficiency of the step-up transformer of the Colfax station of the Duquesne Light Co. is 99 per cent. In most power operations, outside of electric, 60 to 80 per cent efficiency is considered reasonably good, and sometimes 20 to 30 per cent is acceptable. But in electric motors and generators efficiencies such as these would be considered absurd, except in very extreme cases.

When we consider that the efficiency of electric motors and generators, even in comparatively small sizes, reaches as high as 90 per cent, and rises to 96 per cent or better in much larger units, it may be seen that electric operation presents tremendous advantages from the efficiency standpoint. Furthermore, of the 4 to 10 per cent loss in rotating electric machinery, quite an element is purely mechanical loss, due to rotation, so it may be seen that the purely electrical losses represent a very small portion of the total power transformed. In the transformer, a purely stationary device, mechanical losses are absent and it is due to this fact that the efficiency of the transformers is so very high.

It may be said, therefore, that from the efficiency standpoint the electric system, as a whole, is so far ahead of anything else in power generation, transmission and utilization, that there really is no good second.

Flexible Speed Control

From the flexibility standpoint the electric system also possesses enormous advantages. By means of proper converting devices, either of the two outstanding systems, namely, alternating or direct current, can be utilized according to the needs of the problem. Each system possesses peculiar merits of its own. The alternating current system is flexible in voltage, so to speak, but the normal a.c. motor is inflexible in speed. The direct current system, while more or less inflexible in its voltage possibilities, permits greater flexibility in variations and control of speed. Consequently, in many large mill installations, both direct and alternating currents are used.

One of the great limitations of the alternating current motor in some applications, and one of its great merits in other applications, is its inflexibility in speed. It tends to run at a constant speed, and speed variations are not practicable except through the medium of extraneous devices. It is more or less independent of voltage limitations and thus is applicable where very large powers are required and where the problem of carrying such power to the point of application is a large problem. For this reason, in heavy mill work in general, where extremely large motors are used, alternating current has been adopted almost exclusively. The same is true in other power applications of very large units, such as ship propulsion.

On the other hand, where economical speed control

*Abstract of a paper presented at the sixteenth annual convention, Association of Iron and Steel Electrical Engineers, Cleveland.

†Chief engineer Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

‡Vice-president Canadian American Alloy Corporation.

is desired over a very wide range, direct current oftentimes furnishes the most economical solution of the problem. As stated before, the one great advantage of the direct current motor over any other type is in the flexibility of its speed control. For this reason it is not infrequent, in large power installations, to find considerable units of power transformed from alternating to direct current simply to meet economical speed control problems.

A striking instance of this is found in the large electric reversing mills, many of which have been installed throughout the country in recent years. Here we have even more than economical speed control, for through the medium of the a.c. to d.c. transforming equipment, we are able to flatten out the enormously fluctuating power due to the nature of the load, so that comparatively uniform power is taken from the generating system. Here we have the means for transforming from steady power to a violently fluctuating one, or vice versa. This is one illustration of the possibilities of the electric system in regard to flexibility.

From the durability and maintenance standpoints, electric machinery in general ranks high. It is not unusual to find electric machines 20 years old or more, which apparently are in as good condition as new. Wearing parts, as a rule, are confined to the mechanical parts. In electric locomotives, for instance, there may be mild inspections daily, or at some other frequent interval, but complete overhauling may occur only at very long intervals. Compared with the corresponding steam locomotive in similar service, electric locomotives get comparatively little attention, oftentimes much less than the most economical maintenance call for. The same is true, in general, of other applications of electrical machinery. People have become so accustomed to the idea of reduced attendance and reduced repair in connection with electrical machines, that often they carry the matter too far for best results.

Early Electric Developments

Electric motors were placed in steel mills at a very early date. These machines were ordinary motors, not designed for mill service. Five hundred volts was used in some of the first installations, as this enabled the standard railroad motors to be used. Experience soon showed that this was too high a voltage, on account of danger to workmen and also due to insulation failures. Mill type motors were later developed and this design is still used with very little change.

In the development of main drives, Europeans were about 10 years ahead of the United States in applying motors. The first motors were put on mills in Europe about the middle of the '90's, and, as in this country, the first machines were direct current. At an early date, however, induction motors were used for mills where speed changes were not required, these motors usually being belt or rope connected.

The European mills have developed along somewhat different lines from those built in America. In general, tonnage has not been such an important feature in European mills as in American. The business conditions have been such that each mill had to produce a wider range of material and flexibility has been a more important factor than tonnage. We find in most European plants a great variety of mills which are not kept fully occupied, but are necessary to supply the varying demands of customers. This naturally required that the equipment should be kept as cheap as possible, which no doubt accounts for the light construction used.

In recent years, through consolidations and other arrangements, European mills are being laid out to produce a few classes of products and to bring up the tonnage of such products, the market being supplied by the correlation of a number of manufacturers. This has led gradually to a practice approaching the American.

However, the machines in use to-day in Europe are built very much lighter than would be considered advisable here and what would perhaps strike the American mill man as peculiar is the almost universal use of hand wound coils in partially closed slots. The use of

form wound coils for induction machines has not been at all customary except by some of the English manufacturers.

American Practice Differs from European

While all apparatus is subject to failure in itself, it is necessary so to design our American machines that repairs can be made rapidly by the operating force; for this reason the windings are universally of such a type that they can be replaced or repaired by the ordinary mill force. This is not the case with the European designs, where really skillful winders are required to produce satisfactory results.

In the United States the earliest electrical drive of any size was in the motors driving the light rail mill at the Edgar Thompson works. These machines have been in use for 17 years with practically no delays and no cost for maintenance. Very shortly after this, American engineers were called upon to build machines for what still remains the greatest mill electrification—the Gary plant. The boldness of the engineers in laying out this plant has been more than justified and many of our members will accept Gary as a normal development.

It is perhaps not so well appreciated as it should be that this was a great engineering undertaking which involved many different problems. In the first place, a gas engine driven power house of this magnitude never before had been attempted and grave problems were involved in insuring stability of operation. The designing and building of the slow speed induction motors used for driving mills in sizes for which there was no precedent was a great and successful undertaking.

One very highly important factor in this connection was the control apparatus for handling the power involved and all American engineers interested in steel mills are indebted to the pioneer work done at the Gary plant for many of the things which have become commonplace to-day. With the success of the Gary installation, and of many other installations which went in about the same time, there was little question as to the use of motors for driving mills when the speed conditions and power supply seemed favorable.

Influence of Adequate Gearing

One great impetus to the advancement of electric drive has been the development of adequate and reliable gearing. This has rendered the slow speed motor to a large extent unnecessary, thereby eliminating one of the troublesome features of electrification. These slow speed motors were expensive and nearly always special, which involved a heavy tax for development on practically all installations. With the development of gearing it was, of course, a simple matter to change the ratio so that the development charges from an electrical standpoint could be much reduced, and tended to become less and less as successive installations were made.

Development of the reversing mill was a direct outcome of the successful application of the Ilgner system to large mining hoists in Europe. During 1905 investigations were made on a steam-driven mill in Austria, to determine the power requirements. The data available at that time were very meager and a great deal of investigation was necessary to enable an estimate to be made as to the size of motors required.

About the end of 1905 an order was placed for an equipment with the Aktien Electricitäts Gesellschaft of Berlin, which was to develop a maximum of 10,350 hp. This equipment was put into operation in July, 1906, and with the exception of a few minor troubles operated satisfactorily from the beginning. Three separate motors were used for the mill and three generators, all being connected in series, the maximum voltage being about 1600. The equipment was divided into three units in this way, as this did not involve such a large departure in sizes from what had been built previously, and it was thought that the inertia of the equipment would be materially reduced by keeping down the diameters of the motor armatures. The generators had laminated fields and were completely com-

penated. A special exciter was used which, operating on a separate winding on the generator field, opposed the main excitation. The opposing field varied directly with the armature current, as the idea was to provide a stabilizing element which would keep the load from exceeding a certain amount.

About the end of 1905 experiments were conducted on a small scale by the Illinois Steel Co. to determine the operating characteristics of the Ilgner system. That system had not been used in the United States for hoisting so that there were no data available as to its operation. In the spring of 1906 an order was placed with the Westinghouse Electric & Mfg. Co. for the supply of a reversing mill drive for the 30-in. universal plate mill at the South Works of the Illinois Steel Co. This equipment was to develop a maximum of 8000 hp. and it was put in operation about the beginning of 1907.

At the time it was designed and built there was no knowledge of what was being done in Europe, nor did the Europeans have any knowledge of what was being done in the United States. This equipment has been in continued service to date. The motor is a double unit and the novel feature is the fact that there is only one generator, which has two windings. At the time this machine was built it was thought that this construction would be cheaper than single machines, but

this did not prove to be the case. Consequently the idea was not utilized in subsequent installations.

Cost Figures Favor Motor Drive

Some time ago an opportunity occurred to check up the operating figures of two plants producing largely the same class of products and having approximately the same tonnage. One was completely electrically driven and the other steam driven. When due allowance was made for the value of the gas from the blast furnaces, in each case crediting the furnaces with the value of the amount of coal which this gas replaced, and some adjustments made for slight variations in the output of the two plants, it showed that there was a definite advantage in the case of an electrically driven plant of between \$3 and \$4 per ton on material shipped, based on operation of the plants during 1920, when they both turned out as much material as they could. The fact that the advantage of electrification is of the order of dollars per ton is confirmed by the investigations of a reliable firm of consulting engineers in connection with plant valuation, from which they arrived at the conclusion that, under the same conditions of fuel cost, etc., the electrically driven plant had the advantage of at least \$2.50 per ton compared with the steam driven plant with modern equipment.

ANNEALING OF GRAY CAST IRON

Results of a German Investigation on Three Grades of Iron

For many years there has been considerable interest in the annealing of gray cast iron for various reasons. One of them is the removal of shrinkage strains, and another is the replacement of the combined carbon found in the cementite of the pearlite areas by free carbon or graphite and iron.

There is a short paper in *Stahl und Eisen* for Sept.

pieces were cut about 3/8 in. long and subjected to various heat treatments, and then analysed and tested for Brinell hardness. The heat treatments were carried out in a platinum resistance furnace in a quartz tube closed at one end, into which a slow stream of pure nitrogen was introduced to keep down the oxidation and the loss of carbon to a minimum. The small pieces were fastened to a thin nickel wire so that they could be removed quickly from the furnace at the desired temperatures.

The composition and critical points of the irons are given in Table 1.

The first work was done with Iron C, and the aim

Table 1.—Composition and Critical Points

Kind	Material	Composition, Per Cent						Critical Points	
		Total Car.	Gr. C.	Mn.	P.	S.	Si.	Ac ₁ Deg. C.	Ar ₁ Deg. C.
A.	Original iron	3.18	2.49	0.63	0.102	0.068	2.95	810-825	750-725
B.	Iron A with nickel (analysis showed 0.86 per cent)	3.35	2.66	0.62	0.105	0.070	2.93	800-815	735-715
C.	Iron A with about 20 per cent steel scrap	2.48	1.54	0.60	0.090	0.055	2.25	800-805	740-735

28, on this subject by Dr. E. Piwowarsky, of Breslau University, giving the results of annealing tests on three grades of iron. All three irons were in the form of round bars, 0.787 to 0.866 in. dia. From these bars

of the work was to produce as much graphite as possible. The results and the treatments are shown in Table 2.

As shown by the results the formation of temper-

Table 2.—Results with Iron C

Test No.	Treatment	Microstructure	Composition		Gr. in Per Cent of Total	Brinell Number
			Total Car.	Gr. C.		
1.	Original iron	Graphite and lamellar pearlite	2.48	1.54	62.0	236
2.	12 hr. at 675 deg. C. Cooled in air	Graphite and lamellar pearlite	2.47	1.58	64.0	220-225
3.	As above but cooled in furnace 10 deg. per min.	Graphite and lamellar pearlite	2.47	1.65	66.5	210-214
4.	12 hr. at 775 deg. C. Cooled in air	Graphite, lamellar and granular pearlite and some ferrite	2.46	1.84	74.5	153-157
5.	As above, but cooled in furnace 10 deg. per min.	Graphite, granular pearlite and ferrite	2.46	1.92	78.0	147-150
6.	12 hr. at 850 deg. Cooled in air	Graphite and lamellar pearlite	2.39	1.62	67.5	216-218
7.	As above, then cooled in furnace 2 deg. per min. to 750 deg., then cooled in air	Graphite and lamellar pearlite	2.40	1.66	69.0	212-214
8.	12 hr. at 850 deg. Cooled in furnace at 2 deg. per min. to 675 deg., then in air	Graphite and ferrite with some pearlite	2.42	2.24	92.5	122-124
9.	12 hr. at 850 deg. Cooled in furnace at 1 deg. per min. to 675 deg., then in air	Graphite and ferrite with some pearlite	2.40	2.26	94.0	114-118
10.	20 min. at 830 deg. Cooled in furnace at 1 deg. per min. to 775 deg., then in air	Graphite and lamellar pearlite	2.39	1.64	68.5	215-220
11.	20 min. at 830 deg. Cooled in furnace at 1 deg. per min. to 725 deg., then in air	Graphite and ferrite with traces of lamellar pearlite	2.38	2.22	93.0	120-124
12.	20 min. at 830 deg. Cooled in furnace at 1 deg. per min. to 675 deg., then in air	Graphite and ferrite with traces of lamellar pearlite	2.39	2.30	96.0	114-116

Table 3.—Results with Irons A and B

Test No.	Treatment	Microstructure	Composition				Gr. in Per Cent of Total		Brinell Number	
			Total Car.		Gr. C.		A	B	A	B
1.	As furnished, original	Graphite and lamellar pearlite	3.18	3.35	2.49	2.66	78.0	79.5	206-207	196-200
2.	2 hr., 675 deg. Cooled in air	Graphite, lamellar and granular pearlite and some ferrite	3.17	3.32	2.60	2.78	82.0	83.5	168-172	166-168
3.	2 hr., 725 deg. Cooled in air	Graphite, ferrite and lamellar pearlite	3.16	3.24	2.88	2.86	91.0	88.0	134-136	136-140
4.	2 hr., 775 deg. Cooled in air	Graphite, ferrite and some lamellar pearlite	3.08	3.29	2.92	3.10	95.0	94.0	120-125	124-126
5.	15 min. at 850 deg. Cooled in air	Graphite, ferrite and lamellar pearlite	3.06	3.33	2.70	2.88	88.0	86.5	158-162	163-167
6.	15 min., 850 deg. Cooled in furnace at 2 deg. per min. to 700 deg.; then in air	Graphite, ferrite and some granular pearlite	3.14	3.27	3.03	3.11	96.5	95.5	118-124	115-117
7.	15 min. at 850 deg. Cooled in furnace at 10 deg. per min. to 675 deg.; then held at 675 deg. for 1 hr. and cooled in air	Graphite, ferrite and traces of pearlite	3.12	3.22	3.01	3.13	96.5	97.5	114-118	112-116

carbon is very small below A_{r1} , and while somewhat greater between A_{r1} and A_{c1} does not reach satisfactory amounts. Annealing above A_{c1} is useless, but there is practically complete precipitation of the graphite by heating slightly above A_{c1} followed by as slow cooling as possible through A_{r1} .

The results with Irons A and B are shown in Table 3. The structure of the iron containing nickel was

practically the same as the other, so they are shown in one column. Contrary to the other iron there is considerable graphite formation below A_{r1} , and after two hours, annealing between A_{r1} and A_{c1} the greater part of the pearlite is already broken up. The most certain method, however, is to give a short heating slightly above A_{c1} followed by slow cooling through A_{r1} .

G. B. W.

COKE REGION CONDITIONS

Largest Production of the Year—Effort to Relieve Tent Colony Situation

UNIONTOWN, PA., Dec. 2.—A gain of 18,720 tons of coke was made in production during the week ending Nov. 25 over the preceding week in the Connellsville region. Merchant operators again overtook the furnace interests in the gain in output during the week. An interesting phase is the increased production over a year ago but with fewer ovens in operation, a situation which counteracts reports of decreased efficiency in operation as a result of the strike situation in the region. Forty-seven per cent of the ovens of the region are now in operation.

Production during the week was 201,100 tons, the highest this year.

Mayors and burgesses of the county held a meeting in Uniontown this week at which plans were discussed toward relieving the situation resulting from the tent colonies in the region. No formal action was taken although it was reported that the mayors and burgesses would make some effort to have the operators take the striking miners back to work. It is an accepted fact the operators will not co-operate with the Mine Workers' Union. It is common knowledge that former employees who have been on strike would be taken back when needed upon the terms of new employees and under the same conditions as existed before the strike took place.

There is little possibility, however, of any agreement on the part of the operators through efforts of the executives of the municipalities. The strike situation in the region insofar as production is concerned has ceased to be an issue. Many of the operators, too, have discharged the guards at their plants.

The Brier Hill Coke Co. suspended operations at its plant on Wednesday and declared for an indefinite suspension during which time it will electrify the haulage way and mine equipment. The Brier Hill company has 600 acres of coal land.

Car situation continues to be a handicap to the operators in the region. The Fayette-Greene Coal Producers' Association, at a recent meeting, appointed a special committee to investigate the car situation on the Baltimore & Ohio Railroad and on Saturday evening issued a call for a meeting of all operators on that road to be held in Uniontown Wednesday evening, Dec. 6, to hear

the report of the committee and a plan to be presented by Baltimore & Ohio Railroad officials for a change in the system of placing cars.

New Method of Testing Sand to Be Described

At a meeting of the Chicago Foundrymen's Club, at the City Club, 315 Plymouth Court, Chicago, on Saturday, Dec. 9, Eugene W. Smith, the Crane Co., Chicago, will deliver an address on a new method of testing molding and core sands and clays which he has developed within the past few months.

An exhibit of 100 samples of sand from nearly every State, tested by Mr. Smith, will be exhibited in the rooms of the club from noon Saturday until 7 o'clock, when dinner will be served. Following the dinner Mr. Smith will make demonstrations of his testing method and will test any samples of sand which may be submitted to him. By vibratory precipitation, samples of sand contained in small bottles are separated into layers of bond and silica. The ferric and aluminum oxides also may be identified by color and the fineness of the sand may be readily observed. The test has been used by its originator in practical foundry work to determine the class of castings to which different grades of sand are best suited.

Milton O. Knauss Purchaser of Blast Furnace

The purchasers of the Topton blast furnace from the Replogle Steel Co., reported on page 1464 of the Nov. 30 issue of THE IRON AGE, were Milton O. Knauss and associates, not Howard A. Knauss. The latter is connected with the Reading Iron Co., Reading, Pa. The confusion in names was due to the fact that Howard A. Knauss was formerly superintendent of blast furnaces at Catasauqua, Pa., for the Empire Iron & Steel Co., while Milton O. Knauss occupies that position now for its successor, the Replogle Steel Co., Milton O. Knauss and Howard A. Knauss are brothers.

Plans for the organization of chambers of commerce in the principal cities of the country as a step toward harmonizing on a nationwide scale all radio instrumentalities, the effects of which, because of the rapid development of the industry, are producing confusion and disorganization, were announced here by the National Radio Chamber of Commerce at its headquarters, 165 Broadway, New York.

Truck Loader Mounted on Truck Chassis

An application of the truck loader intended to increase the mobility of that equipment when high-speed loading is required at a number of points, is shown in the illustration. It consists of mounting the loading or elevating element of a truck loader of the bucket type on a motor truck chassis. The equipment shown is that of the George Haiss Mfg. Co., 141st Street, New York.

The standard path digger elevator is used with double chain, toothed buckets and feeding propellers, so that no shoveling is required for a path into the pile for the loader. It is pivoted on standard A-frames over the rear wheels, and may be collapsed while traveling. A two-way side discharge chute is provided at the top for loading on either side. The elevator is driven from the jack shaft or by a separate engine, the latter plan being more efficient, though more expensive, as the truck chassis can be moved while loading. The capacity is 1 to 2 cu. yd. per min. The equipment illustrated is said to have loaded 4 tons of egg coal in 3 2/3 min., a rate of 1 1/2 cu. yd. per min.



Truck Loader Mounted on Motor Chassis for Quick Loading at Several Points

Valley Iron and Steel Plant Operations Well Maintained

YOUNGSTOWN, Dec. 5.—In the Mahoning and Shenango Valleys, iron and steel plant operations are holding at a very satisfactory rate. Suspension this week of the Tod blast furnace by the Brier Hill Steel Co. will be offset by the resumption of one of the two stacks at Hubbard, Ohio, operated by the Youngstown Sheet & Tube Co., giving it five active furnaces, of six. The Brier Hill company's Tod stack has been operating on merchant iron.

Sheet mill production is down somewhat from the levels maintained until recently, with 96 of 109 units scheduled. The Republic Iron & Steel Co. has its sheet department on a 50 per cent operating basis. The Falcon Steel Co., Niles, has added one sheet mill to the four units which were rolling last week, while the Sharon Steel Hoop Co. has added three sheet units to its active list.

Steel output approximates 80 per cent, with 55 of 66 open-hearth furnaces charged. The Brier Hill company this week cut the number of its active open-hearth units from 11 to eight. All three Bessemer converters in the Mahoning Valley are blowing.

The Carnegie Steel Co. is pouring from all six blast furnaces at its Ohio works and is operating 17 bar mills at its Youngstown plants. The Trumbull Steel Co. has 37 sheet, tin plate and jobbing mills active.

At its Girard works, the A. M. Byers Co., Pittsburgh, is operating one blast furnace, 75 puddle furnaces, bar mill two 12-hr. turns and plate mill one 8-hr. turn.

In the Shenango Valley, the Carnegie Steel Co. properties are operating virtually at normal. With exception of two inactive tin plate mills, the American Sheet & Tin Plate Co. plant at Farrell is 100 per cent.

Fabricating plants are still producing at a high rate, though several are slowing down for inventory.

Independents Follow Corporation on Tin Plate Price

YOUNGSTOWN, Dec. 5.—While independents still show dissatisfaction with the \$4.75 price on tin plate, announced for the first quarter by the leading interest, they are all falling in line with this quotation and are taking forward commitments. Lower iron and steel-making costs are offering some compensation for the failure to establish a higher quotation, as was expected. Preliminary developments indicate a heavy 1923 demand for tin plate. Can makers are coming into the market and placing business for next quarter, including releases against such tonnage. Makers indicate that they are discontinuing concessions from the \$4.75 price, but it is likely that preferred customers will enjoy preferential treatment. For instance, though \$4.75 has been the nominal tin plate quotation for a period of months, a number of producers have been rolling tonnages accepted at \$4.60 per base box.

While the plate market is spotty, nevertheless enough small tonnages are coming through to represent a sizable aggregate. On small orders, the chief independent interest in this territory claims to be obtaining 2.10c., but the bulk of the business moving is going at 2c. or less. The above company is working off an accumulation of large-mill plate sizes and building up stocks, in preparation for the suspension of its 132-in. mill for alterations.

New Steel Castings Company in New Jersey

Eastern Steel Castings, Avenue L and Edwards Street, Newark, N. J., will take over early in 1923 the business now carried on by Bayonne Steel Casting Co., Bayonne, N. J. It has a modern and enlarged plant, equipped for making both open-hearth and electric steel castings and retains the experienced organization of the older company. William D. Sargent, president of the Bayonne company, is head of the new organization.

Youngstown Companies May Be Absorbed

YOUNGSTOWN, Dec. 5.—Inclusion of one or more Valley independent iron and steel interests in an amalgamation is regarded as likely, especially in view of the recent absorption of the Midvale Steel & Ordnance Co. by the Bethlehem Steel Corporation.

A leading Youngstown independent has been casting about for some time in an endeavor to establish a pipe manufacturing connection in the Chicago district, either through purchase or construction.

Common stock of the Youngstown Sheet & Tube Co. is to be listed on the New York Stock Exchange in the near future, according to present plans, and the possibility of heavy purchases by Eastern interests has been referred to by leading steel makers.

That Valley independents appreciate the advantages of an acceptable consolidation in strengthening their own position in a competitive field, they have freely indicated.

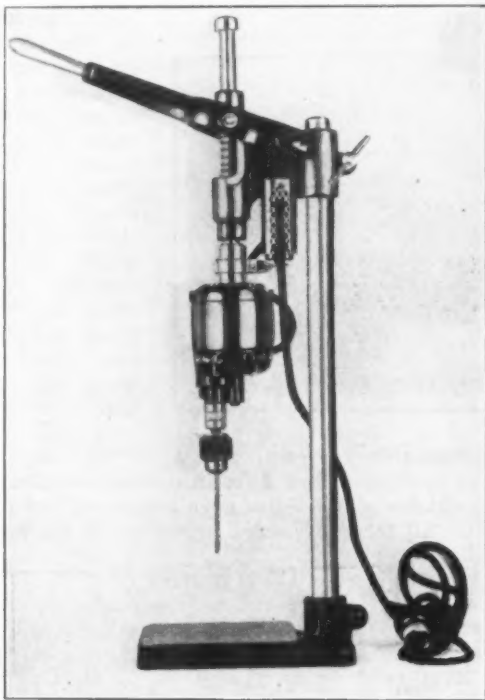
Henry C. Turner, receiver for the Empire Tube & Steel Corporation, College Point, L. I., will receive sealed bids at his office, 2 Rector Street, New York, until Jan. 5, for the purchase of the plant, equipment and property of the company.

Automatic Drill for Light Operations

A small bench type drilling machine intended for manufacturing purposes involving light drilling operations and having as a feature automatic starting and stopping of the motor, has been placed on the market by Joseph W. Jones, 29 West Thirty-fifth Street, New York.

The location of the motor may be seen from the accompanying illustration; it is started or stopped automatically as the handle is lowered or raised. Current is being used only when the machine is actually drilling and besides the saving in current, this arrangement is intended to add to the life of the unit by reducing wear and tear on the motor and other parts.

The machine is rated to drill holes up to $\frac{1}{4}$ in. in steel. Bronze bearings with suitable provision for oiling are provided throughout. The armature speed is



Bench Drill for Light Manufacturing Operations. The motor is automatically started and stopped as the handle is lowered and raised

reduced $4\frac{1}{2}$ to 1 by means of hardened steel gears and a ball end thrust accommodates the pressure at this point. The drill is equipped with a Jacobs $\frac{1}{4}$ in. chuck. The speed is 3500 r.p.m. on alternating current and 4000 r.p.m. on direct current. The size of the base is $6 \times 7\frac{1}{2}$ in. and the height 20 in. The weight of the machine is 18 lb. net.

Duplexing with Electric Furnaces

An interesting "new steel making process" has been put in operation at the works of Edgar Allen & Co., Ltd., Sheffield, England. Concerning the equipment and the claims, the Stobie Electric Steel Co., Dunston-on-Tyne, writes as follows:

We have installed in those works one 10-ton and one $3\frac{1}{2}$ -ton Stobie electric steel melting furnaces which are being worked together as a single unit under the Stobie patent duplex electric process. By this means, scrap steel is electrically melted and refined by oxidation in a continuous manner in the large primary furnace, and a third or more of the molten bath is transferred down a shoot at short intervals to the small secondary furnace for finishing. The advantages of the process are both electrical and metallurgical.

Electrically, the load factor is greatly increased by the continuous working, and the power factor is much improved by the maintenance of, mainly, molten baths. Fluctuations of current are, also, less marked and of shorter duration.

Metallurgically, the main advantage is the frequent

supplies of small quantities of steel, of varying compositions if required, at the low cost of operating a plant of large output. For ingot or foundry work, this advance in practice is of considerable interest.

Additional advantages of the new process over an installation of several furnaces working independently include the less space occupied by the plant; the reduced crane service required; the much reduced repairs to furnace linings for a given output of steel and the freer choice in scrap for melting.

Colorado Fuel & Iron Decreased Deficit

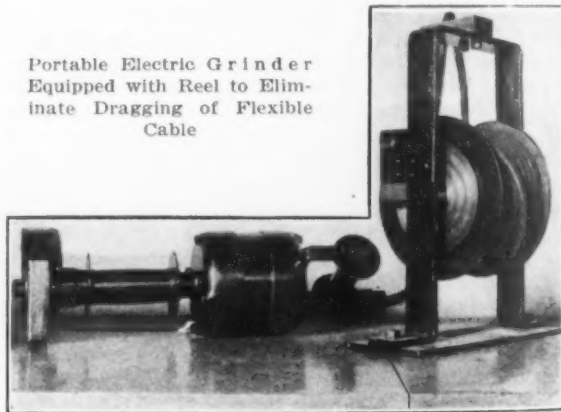
The gross receipts of the Colorado Fuel & Iron Co. for the three months ending with September were \$7,266,964, or \$1,697,817 larger than those for the corresponding period in 1921. Operating expenses were \$946,162 larger than those for the 1921 quarter, standing as they did at \$6,376,401. Thus the net earnings were \$890,563, while in the 1921 quarter they were \$138,908. Other income brought the earnings for the third quarter up to \$963,955, but after interest, taxes and depreciation, there was a deficit of \$131,463, whereas in the three months ending Sept. 30, 1921, there was a deficit of \$810,868.

The financial statement for the nine months ending with September, last, is not so encouraging. Gross receipts amounted to \$22,492,865, whereas for the same period in 1921 they were \$23,587,982. Operating expenses were \$19,993,964, while last year they were \$21,669,486, and total net income \$2,706,288, as against \$2,221,401, while the deficit for the first nine months of this year was \$581,162, or \$2,068 larger than the deficit for the same period last year.

Reel for Use with Portable Grinder

For use with its standard portable electric grinder, and to eliminate dragging of the flexible cord over the floor and catching on projecting objects, etc., the reel shown in the accompanying illustration has been developed by Forbes & Myers, Worcester, Mass. With this equipment the life of the flexible cable is considerably increased and it is intended to make the grinder

Portable Electric Grinder Equipped with Reel to Eliminate Dragging of Flexible Cable



a permanent fixture of the shop, always ready for use by merely closing the switch.

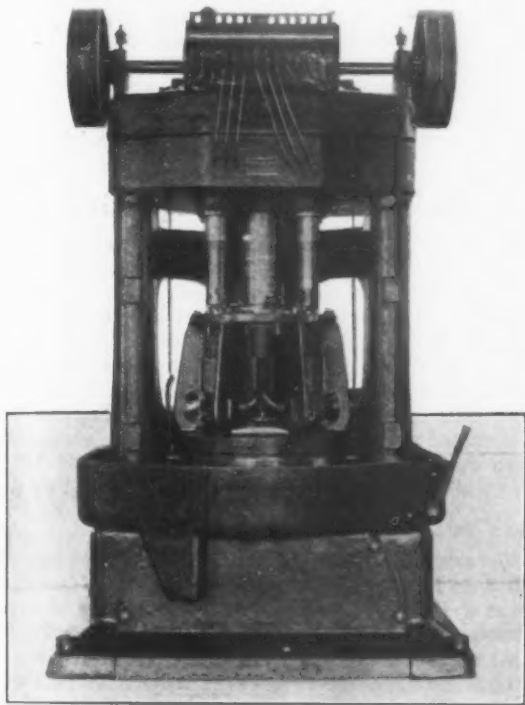
The outfit illustrated consists of a standard machine, the new reel, and 35 ft. of flexible cable. When the reel is placed centrally, either on the ceiling or on a column, the 35 ft. of cable is adequate for a room 60 ft. square. A four-wire cable is used. Three wires are for the three-phase power current, this current being said to be preferable to the single-phase from the light socket. The fourth is a ground wire which connects the frame of the grinder permanently to the frame of the reel, regardless of whether the switch is open or closed. When the frame of the reel is connected to a water pipe or other permanent ground, danger of electric shocks is minimized.

The iron ore in North Carolina has been reported on by W. S. Bayloy, in bulletin 735-F of the United States Geological Survey, Washington.

Cylinder Boring Machine

A machine designed primarily to bore air-cooled gas engine cylinders and finish the head of the cylinder at the end of the bore, is being marketed by the Manufacturers' Consulting Engineers, Syracuse, N. Y. It is also adaptable to the boring of gas-engine cylinders en bloc and it is claimed that in the case of block cylinders having removable heads, the machining time would be reduced considerably. The machine as shown in the accompanying illustration is large, the height from floor to top of pulley being 8 ft. 2 in. and the base approximately 5 ft. square.

In boring, three separate cuts are taken, and in finishing the head of a cylinder two separate cuts are



Multiple Spindle Machine for Boring Gas Engine Cylinders and Finishing the Head at One End of the Bore

taken. There are five spindles which rotate but do not move axially, so that all five cuts are taken at the same time in separate cylinders. The work is mounted in a rotating fixture having five working positions and one loading position, loading and unloading are done while cuts are being taken. The work holder and work are fed upward on to the cutting tools by a cam which is said to permit of quick return, quick approach, uniform boring, a reduction in feed for finishing the head of the cylinder and a dwell for the final finish of the head of the cylinder. The time of a cycle for boring a 3¼-in. cylinder, 9 5/32 in. long and finishing the head, is 1½ min.

The machine is rigidly constructed, and the rigid and accurate relation held between cutters and fixtures is emphasized. This is obtained through the use of the large diameter pilot which is integral with the head of the machine and pilots in the ram which is actuated by the cam and on which is mounted the rotating fixture. Coolant is used to keep cylinders at approximately constant temperature throughout the cut and so no heat distortions appear. It is pumped through the spindles and discharged adjacent to the cutting tools on to the surface to be machined. Passing through the spindle, the coolant keeps the spindle and bearings at constant temperature. It also serves to wash chips away as soon as made.

The machine is semi-automatic, the only duty of the operator being to load and unload the work while the machine is in operation, and index the fixture when the machine comes to rest automatically at the end of the quick return, and throw in the clutch after the fixture has been indexed.

Clock Dial for Control Under Manufacturing Budget

Included among twenty-five forms presented in a treatise on budgeting as a means of business control, issued by the fabricated production department of the Chamber of Commerce of the United States, is a novel clock arrangement by which the small manufacturer can tell at a glance the daily state of his business.

Clocks, or dials, are devised for each of the principal activities of the business. Each clock has two hands, a red one, pointed at the budget allowance, which remains stationary for the entire month, and a black hand, which is daily set at the amount of money spent by each department. The dials can be arranged so that they can be conveniently contained in a flat box 2 in. deep, 24 in. wide and 50 in. long, designed for hanging on the wall.

The idea was conceived and put into operation by a manufacturer of optical goods, who found that his organization could be conveniently divided into the following five groups: material, factory, administration, sales and advertising. The five executives at the head of these departments are placed into a business of their own and are told what the results of their next month's activities should be, together with the amount of money they may spend to produce these results. The sales manager is told how much in orders he is expected to get to keep the factory running; the factory superintendent, how much goods he must get out and how much accounts receivable he must create to provide the funds necessary in the following month; the purchasing agent, how much material is necessary to keep a well balanced inventory and to take care of the plans of the sales department; the advertising department and administration, how much money they may spend in carrying out these plans.

A copy of the pamphlet, "Budgeting for Business Control," may be secured by writing direct to the Fabricated Production Department, Chamber of Commerce of the United States, Mills Building, Washington.

Critical State of South Russian Metal Industry

"The facts revealed by a special commission of inquiry appointed by the Soviet Government show that the metal industry in South Russia has touched such a low ebb that only the most urgent and radical measures can save it from complete destruction." The statement is made in the Russian Supplement to Industrial and Labor Information, the weekly publication of the International Labor Office at Geneva.

The total output of the metal works in Southern Russia at the present moment amounts to only 4 per cent of the pre-war output, while orders on hand represent 15 to 25 per cent of the present possible output of the works. This shortage of orders, added to the fact that the price paid by the state is considerably lower than the cost of production, has resulted in the works being run at an enormous loss.

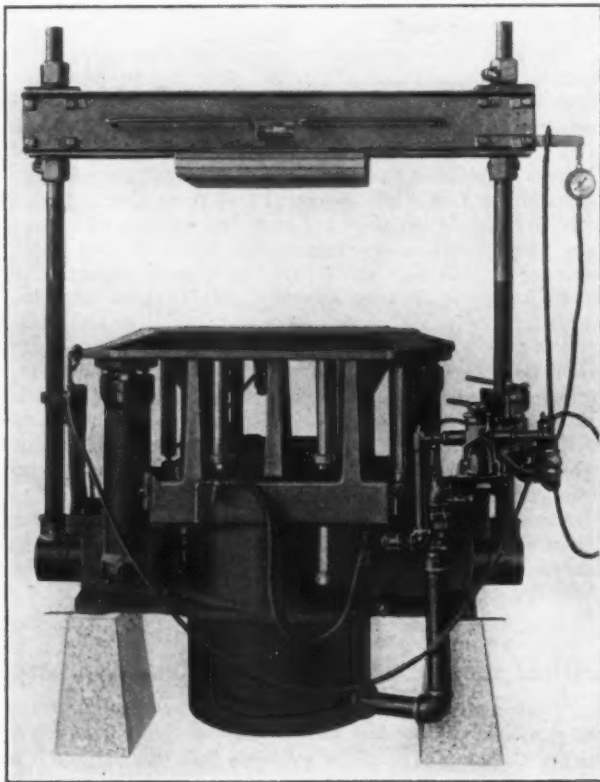
In view of this, the committee decided that the only solution to the problem was to close all the metal works in Southern Russia with the exception of three, each equipped with one blast furnace, and to concentrate the entire production program in these three works. Even to realize this scheme, the Government will have to spend at once about 550 million roubles a rouble being calculated at 3,400 to £1, of which nearly 400 million are classed as "arrears in workers' wages" while a monthly subsidy of 750 million roubles will also be needed.

The American Engineering Council, the executive organ of the Federated American Engineering Societies, will meet in Washington, Jan. 11 and 12. Dean Mortimer E. Cooley, president of the federation, will preside. The 12-hr. day in industry, topographic mapping, government reorganization, types of government contracts and a wide range of other engineering, political and economic topics will be discussed. The plan for an engineering investigation into the Muscle Shoals situation will come up.

Large Split-Pattern Molding Machine

Mumford jolt-squeeze split-pattern molding machines, constructed as shown in the accompanying illustration, are being offered by the Hanna Engineering Works, 1765 Elston Avenue, Chicago. The equipment shown accommodates a 24 x 24-in. flask, has a 12-in. pattern draw and is 56 in. between strain rods. The squeeze cylinder is 21 in. in diameter.

In this design the height of the swinging yoke may be varied on the tubular strain rods by adjustment of the split strain rod nuts which lock into place. The design of the counter-tension device permits adjustment of the counter-tension spring by the operator, so that when the swinging yoke is in the rear position, a slight touch of the hand will cause it to swing to the upright.



Large Jolt-Squeeze Split-Pattern Molding Machine. When swinging yoke is in rear position, a slight touch will cause it to swing upright

The counter-tension device is inclosed in the base and is adjustable from the outside.

The ramming head is the same as in the company's smaller units. Flask pin lugs are cast integral with the ramming-head posts to which the vibrator frame is attached by fillister head screws passing through hardened steel bushings encased in the vibrator frame. The bushings have only sufficient clearance to allow vibration, giving alinement between pattern plate and the flask pins.

Pattern drawing is accomplished by means of two automatic slow-start oil pattern draft cylinders, controlled by a knee valve. A smooth slow start is given for the first $\frac{3}{4}$ in. and a rapid finish for the balance of the pattern draw, thereby leaving the operator's hands free to pick up the mold the instant the pattern is drawn. While the mold is being carried to the floor the flask frame settles to its initial position, the machine being ready for the next flask.

The pattern draft guide plungers have bearing in the cylinders their entire length and are fitted with leather hat packings held in place by glands of standard shape. This design is intended to meet the conditions of the draw feature, as the same pressure which drives the draw plungers up squeezes the packing around the plunger. When pressure is relieved from beneath the plungers, the packing releases, allowing the flask frame to return without resistance except as the flow of oil is controlled through a suitable cock provided for that purpose.

Jolting is accomplished by means of the Mumford one-piece, heat treated, no-spring jolt valve. This is inserted through the side of the cylinder and protrudes into a pocket which is longitudinal with the axis of the plunger. Both side walls of this pocket have machined strips which are parallel to each other and to the axis of the plunger and the axis of the hole which embraces the inside jolt valve. The latter is cylindrical except near the inside and where two flats have been milled on opposite sides and parallel with each other, thus forming a cubical plug which fits between the flats on the sides of the pocket in the plunger. The inside jolt valve is supported rigidly in the cylinder, and an inside guide for the jolt-squeeze feature is incorporated, the surfaces of which are practically at right angles to any twisting or swirling motion of the plungers. These surfaces are constantly lubricated by the oiling system provided for the cylinder and plunger, and are adequately protected from sand and rust.

The squeeze plunger and cylinder are unusually long, which is intended to assure long life and smooth operation. The plunger is provided with cast iron piston rings and the squeeze valve is of the air brake type.

Railroad Situation Improving

WASHINGTON, Dec. 5.—With loading of revenue freight continuing to be the heaviest in the history of American railroads for the present time of the year, according to a report of the Car Service Division of the American Railway Association of last Thursday, there is also a continued increase of the number of cars and locomotives installed and on order, and a reduction in the number of cars in need of repair. For the week which ended on Nov. 18, loading of all commodities totaled 969,094 cars. This is an increase of 178,731 cars, or about 23 per cent over the corresponding week last year, and an increase of 79,956 cars over the corresponding week in 1920. This also was an increase of 15,185 cars over the week before, when, however, car loading declined owing to the observance of Armistice Day as well as election day. The number of new railroad-owned equipment installed from Jan. 1 to Nov. 15 totaled 58,189 cars, an increase of 3415 since Nov. 1. The total number of box cars installed was 20,370, an increase of 1018 since Nov. 1, and of coal cars 28,615, an increase of 1803 since Nov. 1. The total number of cars on order Nov. 15 was 63,016, of which 30,948 were box cars, an increase of 104 since Nov. 1, and 23,437 coal cars, an increase of 866 since Nov. 1. The net increase of all classes of cars since Nov. 1 was 552, while the total increase in cars installed and on order compared with 1921 was 51,769.

Locomotives installed from Jan. 1 to Nov. 15 totaled 961, an increase of 95 since Nov. 1, while those on order Nov. 15 totaled 1288, an increase of 56 since Nov. 1 and of 867 when compared with 1921.

Freight cars in need of repair totaled 235,660 on Nov. 15, or 10.4 per cent of the cars on line, the smallest number in need of repair since Feb. 15, 1921, and a reduction of 14,300 since Nov. 1, this year, at which time there were 249,960 or 11 per cent. Since July 1 last, when the shopmen's strike began, there has been a reduction of 88,923 in the number of cars in need of repair, the total on that date having been 324,583, or 14.3 per cent of the cars on line.

The annual meeting of the Ohio State Foundrymen's Association will be held at the new Hotel Manchester, Middletown, Ohio, Dec. 7 and 8. An exceptionally interesting program has been arranged for the two days' session, including the annual banquet Thursday evening and an inspection of the plant of the American Rolling Mill Co., Friday morning. Following the sessions, the visitors will be entertained in Cincinnati.

Production in the Connellsville bituminous region for the week ended Nov. 11 was 176,880 tons, an increase of 12,560 tons over the preceding week. This brings the 1922 output to that date to 4,280,890 tons, or 1,229,610 tons greater than the production over a like period in 1921.

BOOK REVIEWS

The Welding Encyclopedia. Compiled and edited by I. B. Mackenzie and H. S. Card. Second edition. Pages 314, 6 x 9 in. Published by Welding Engineer Publishing Co., 608 South Dearborn Street, Chicago. Price, bound in flexible imitation leather, \$5.

Designed as a reference book on the theory, practice and application of the four autogenous welding processes, the first 149 pages consist of a dictionary of all words, terms and trade names used in the welding industry. Then come separate chapters on oxy-acetylene welding, electric arc welding, electric resistance welding and thermit welding. Instructions are given for welding operations on the most common types of repair and production work and descriptions of the application of welding to various industries. The data and instructions cover both ferrous and non-ferrous metals.

Special attention is given to pipe, boiler and tank welding and rail joint work. The rules and regulations of the principal authorities governing boiler and other work and safeguarding welding operations are gathered into a chapter of 27 pages. The heat treatment of steel is given its due meed, with color charts for judging temperatures, etc., particularly in connection with the use of the acetylene flame. Charts and directions for preparing joints for welding and a catalog section of 74 pages (making a total volume of 388 pages) complete the work. It is profusely illustrated, both by diagram and half tone.

Hütte—Taschenbuch für Eisenhüttenleute. Compiled by Akademischer Verein Hütte, Berlin. Pages 982, 5 x 7½ in.; illustrations, 511. Published by Wilhelm Ernst & Sohn, Berlin, Germany. Price, 738 marks.

The association of German engineers that is publishing the well known mechanical handbook "Hütte," now in its twenty-third edition, issued in 1910 a supplementary volume covering the problem of the technology and operation of the iron and steel industry. The second printing of this work has been issued. The volume is handier, less bulky because thinner paper has been used; the number of pages remains the same but the content in the new edition is larger on account of the use of two kinds of type.

The subjects are dealt with in the usual way, terse statements, quotations of fact, results and conclusions without any trimmings; each chapter is from the pen of an authority on the problem presented and over fifty experts collaborated in the making of the book. The study of the book, full of references to current German periodicals, is difficult to those not well acquainted with the language and literature. This will handicap the value of the book outside of Germany.

The first 200 pages cover the scientific fundamentals with few changes; the chapter on mineralogy has been superseded by a study on iron ores and deposits, the numerous varied specifications have been omitted to advantage and the art of measuring has been added. Pyrochemistry of refractories and slags is one notable subdivision incorporating some new illustrations that reflect up-to-date research.

The second section deals with combustion and offers a completely new and practical treatment of that important industrial problem. The second subheading has been rewritten and adapted to the standard of to-day. The theoretical information is well presented and cleverly interwoven with useful tables and practical data. The chapter on industrial furnaces has also been considerably improved, although the reviewer misses the furnace theory of Groume-Grimailo for an explanation and calculation of sections and flow of gases. The slagging gas producer has been treated too generously for its importance, while the by-product producers have not been given a square deal. The addition on heat economics is most timely in these days of high fuel prices.

The third chapter is completely new, an interesting addition. The installation of steel plants is discussed from all angles, general, construction, mechanical trans-

portation, legal and economic, including technical organization and accounting.

The machinery of steel plants furnished the material of the next chapter. The practical point of view of the operator is emphasized and backed by numerous facts, tables, results of test to help the correct solution for design of power houses and judicious choice of machinery. The predominance of the gas engine seems extraordinary to the American student but is explainable by the different economic conditions existing in Europe. Worth mentioning also is the preference of piston blowing engines over centrifugal units.

The fifth chapter deals with iron and steel production and foundries. The present status of German experience in blast furnace construction, layout and operation is concisely put forward, but American conditions have evolved different solutions and other standards that preclude comparisons. The basic Bessemer (Thomas) process is of no interest at all to Americans and the open hearth process is not treated according to its increasing importance. The reviewer feels that this section has been neglected especially if compared to the subsequent chapter.

Rolling, design of rolling mills and their operation, their heating furnaces, the art of grooving and finishing steel products are discussed in the sixth chapter with great care and thoroughness. The absence of comprehensive data on these subjects makes the information valuable to the designer and valuable to the operator, although exception has to be taken to some statements or details that do not apply to American conditions. In fact, the latest developments or tendencies of evolution have not been considered, and since 1914 considerable progress has been made. The pages dealing with butt and lapwelding pipe are exceptionally poor and not up to the standard in spite of recent publications in Germany that do justice to this important branch of the rolling mill.

The enormous amount of material gathered, digested and condensed in the 500 pages should be made available to the English speaking engineer, not by a direct translation but by an adaptation to American needs of the information given.

J. F. S.

Science and Common Sense in Working with Men. By Walter Dill Scott and M. H. S. Hayes. Pages ix + 154, 5 x 7½ in. Published by the Ronald Press Co., 20 Vesey Street, New York.

This little book deals with the function of personnel administration, and in particular with that function as it exists in the average manufacturing establishment to-day. Fifty years ago, it is pointed out, the average establishment numbered considerably less than one hundred souls, and the manager of that day was perforce so close to his employees that he automatically performed the duties of a personnel administrator along with many others.

But to-day, with manufacturing establishments ten to twenty times as large, and with the changed conditions which the years have brought, the problem of properly selecting personnel is increasingly difficult, and must be delegated by a works manager to a personnel executive. So, after briefly showing the needs of this executive, and advising on his selections, the most of the book is devoted to recommendations for his guidance. On the premise that workers are individuals and not a bulk mass, various individual tests are described, both physical and mental, and methods for recording and interpreting them given.

Since Professor Scott was director of the committee on classification of personnel in the army, he and his co-author have excellent sources from which to provide considerable of the data presented. And the presentation is ably made.

E. C. R.

The Gantt Chart. By Wallace Clark. Pages xii + 157, 5½ x 8½ in.; illustrations, 43. Published by the Ronald Press Co., 20 Vesey Street, New York.

Perhaps because the title of this book is rather vague, the author explains at the outset that the Gantt chart is an aid or working tool of management in that it is used to relate facts to time in a graphic manner. No other phase of management is touched on, the book

being entirely confined to an explanation of Mr. Gantt's methods of graphically portraying facts in relation to time.

After giving a simple illustration of the use of an actual chart, detailed explanations of the construction of a chart is made, including the standard notations for a chart as developed by Mr. Gantt. From that on through the remainder of the book the text is confined to actual examples of the chart. Its use during the war to measure the efficiency of industries working upon munitions, and in the shipyards to aid in following all phases of ship-building is explained in great detail, and accompanied by many illustrations of the actual charts developed.

Its possibilities in industry in connection with both planning and production and as a means of following them up are given. The book is concluded with two appendices, one by Frank W. Trabold, entitled "How a Manager Uses Gantt Charts," and the other by Walter N. Polakov, entitled "The Measurement of Human Work."

E. C. R.

Applied Motion Study. By Frank B. Gilbreth and L. M. Gilbreth, Ph. D. Pages xviii + 220, 5 x 7½ in.; several illustrations. Published by Sturgis & Walton Co., New York.

This book is really a collection of papers presented before various scientific and industrial bodies at various times, outlining the principles and practice of motion study and describing its application to various fields of industry. When several papers on such a subject are collected and published in book form intact, a certain amount of repetition is bound to occur, particularly in the description of apparatus such as is used by the Gilbreths in their motion study methods.

Of the ten papers reproduced in this book, four are largely devoted to the description of the aforementioned apparatus. In considerable detail, they describe the application of photography and the motion picture camera to the study of motions, with a view to obtaining records, a study of which permits of eliminating waste motions, and teaching novices the type of motions used by experts in any particular field. The concluding article of the series described the effect of such motion study investigations upon the workers.

Three of the remaining five papers treat on scientific management in a more general way, covering its need, its methods and its practice. One paper is devoted to the possibilities of motion study for the aid of crippled soldiers and one describes the "three position plan" of promotion as developed by the authors.

E. C. R.

What is entitled "The Testimony of a Decade" is an impressive booklet issued by the American Sheet & Tin Plate Co., Frick Building, Pittsburgh, setting forth service tests under which copper steel alloys for sheet and tin mill products were shown particularly advantageous. One unusual chart based on the sheet tests at Pittsburgh, made under the supervision of the American Society for Testing Materials, shows that a low copper content in sheets of both iron and steel could not resist exposure well, the low content being designated as under 0.05 per cent copper, while the high copper content of the Keystone copper steel was in many cases still sound after 64 months' exposure. Besides numerous tables and opinions of various authorities, the booklet includes a remarkable photograph of the sheet exposure test plant at Pittsburgh, showing the various states of preservation on April 1, 1922.

An operator's handbook of 93 pages, 6 x 9 in., covering its Mult-Au-Matic has been issued by the Bullard Machine Tool Co., Bridgeport, Conn. A chapter is devoted to the scope, novel features and general and detail construction. The sequence of functions and interrelation of actuating mechanism of the Mult-Au-Matic is taken up and also the dimensions of the 8 and 12 in. machine. Space is given to motor drive and speed and feed data, a speed and feed chart being included. A section on the installation of the machine gives detail

instructions and is illustrated by several installation diagrams, a line cut showing the standard method of slinging being given. The lubrication and cutting compound system is explained and illustrated, instruction as to oils and oiling being given. A detailed view of the lubrication and cutting compound system is included. Instruction as to starting the machine is given in several pages and a section on setting up is illustrated by large line cuts. Standardized tools and attachments, also typical tooling diagrams for various classes of work are treated of and illustrations are given of typical tooling diagrams covering a variety of work. The latter, with the accompanying data, serve to indicate Mult-Au-Matic methods. A section is devoted to operation and care and another to maintenance adjustment. A large feed chart is inserted in the booklet. Simplicity of diction and diagram is a feature that makes for easy reading and the instructions cover every unit and function of the machine.

The Story of Peat

The United States contains 12,000 sq. mi. of unused peat land, an area more than ten times that of Rhode Island, capable of yielding 14 billion tons of fuel at a cost of \$1.50 to \$5 a ton, according to a comprehensive bulletin on the subject just issued by the United States Geological Survey. The deposits are on the surface and lie in the New England, Atlantic Coast, and Great Lake States, most of them in regions remote from coal mines. This bulletin, which required two years for its preparation, points out the location of thousands of deposits, owned by thousands of farmers and other landowners.

Fifty million tons of peat is used annually as fuel in Europe. Peat is suitable also for use as a fertilizer and in promoting the intensive growth of truck crops, both in greenhouses and in open fields. Manufacturers of commercial fertilizers are paying as much as \$10 a ton for good peat. The present output is about 100,000 tons annually. In some parts of the country the yearly proceeds from the intensive cultivation of peat and muck soil for lettuce, celery, and onions amount to more than \$500 an acre.

Those who own or are interested in deposits of peat or muck may obtain free copies of the bulletin by addressing the U. S. Geological Survey, Washington. It was prepared by C. C. Osbon and is published as the survey's bulletin 728, entitled "The Occurrence and Uses of Peat in the United States."

New Books Received

American Malleable Cast Iron. By H. A. Schwartz. Pages 416, 6 x 9 in.; illustrations 190. Published by Penton Publishing Co., Cleveland. Price, \$7.

British and American Foundry Practice. By P. G. H. Boswell. Pages 106, 5½ x 8½ in.; illustrated. Published by Hodder & Stoughton, Ltd., Warwick Square, E. C. 4, London. Price, 4s. 6d. net.

Stores and Materials Control. By Madison Cartmell. Pages 459, 5½ x 8½ in.; illustrated. Published by Ronald Press Co., 20 Vesey Street, New York. Price, \$4.50.

Railroad Freight Transportation. By L. F. Loree. Pages 771, 5 x 8 in., illustrated. Published by D. Appleton & Co., 29 West Thirty-second Street, New York. Price, \$5.

Belt Conveyors and Belt Elevators. By Frederic V. Hetzel. Pages 333, 6 x 9 in.; illustrations, 291. Published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York. Price, \$5.

Fuel Oil in Industry. By Stephen O. Andros. Pages 203, 6 x 9 in.; illustrations, 93. Published by Petroleum Extension University, Inc., Citizens Trust Building, Fort Wayne, Ind. Price, \$3.75.

Production Grinding. By Fred B. Jacobs. Pages 218, 6 x 9 in.; illustrations, 188. Published by the Penton Publishing Co., Cleveland. Price, \$3.

The Control of Quality in Manufacturing. By George S. Radford. Pages 404, 5½ x 8½ in.; illustrations, 89. Published by the Ronald Press Co., 20 Vesey Street, New York. Price, \$5.

HIGH TEMPERATURE MELTING

Ryan Furnace, a New Type in This Field—Novel Scheme to Increase Output

A new rare alloy melting and refining plant, unique in many ways, has recently been put in operation in the center of industrial New York. The entire output of the plant is restricted to the melting of what may be termed "higher temperature metals" such as chromium, nickel-vanadium, chrome-nickel-tungsten, palladium alloys and pure tungsten, all of which necessitate temperatures in the melting zone of 3600 to 4300 deg. Fahr. The installation is that of the Bario Metals Corporation, 147 Varick Street, New York. All operations in melting and casting are done with electric furnaces and ovens. The equipment includes three Ryan high temperature melting units, one Northrup high frequency furnace and one electric core and mold baking oven.

The Ryan furnace is claimed to present a new departure in electric metal melting. The units in the Bario plant have a holding capacity of 125 lb. per heat and are rated as capable of melting and refining alloy mixtures in 30 to 40 min. from the time the cold charge is placed in the furnace. The furnace is of the graphite resistor type; that is, the heat is developed by the passage of current at particular voltages and specific quantities through a stationary graphite electrode. Furnace temperatures up to 4300 deg. Fahr. have been attained. While temperatures higher than those stated are obtainable in the arc furnace, the difference claimed is that in the Ryan furnace there is an equable diffusion of the heat over the entire bath and the temperature gradient between the melting and refining point of the metals and the heat at the electrode can be kept very close, eliminating superheating which is detrimental in alloy melting operation.

With reference to metallurgical operations, the fur-

nace has sufficient door area and clearance to carry on any necessary slagging or charging operations. The furnace is adapted for the melting of higher temperature metals, such as those named and the manufacturer and developer of the furnace, F. J. Ryan & Co., Wesley Building, Philadelphia, do not believe that units over 500 lb. holding capacity will become practical owing to the restriction in size and length of electrodes and their placement throughout the furnace. However, in capacities from 50 lb. up to 500 lb. the arrangement and operation are regarded as presenting no new difficulties over present electric furnace practice.

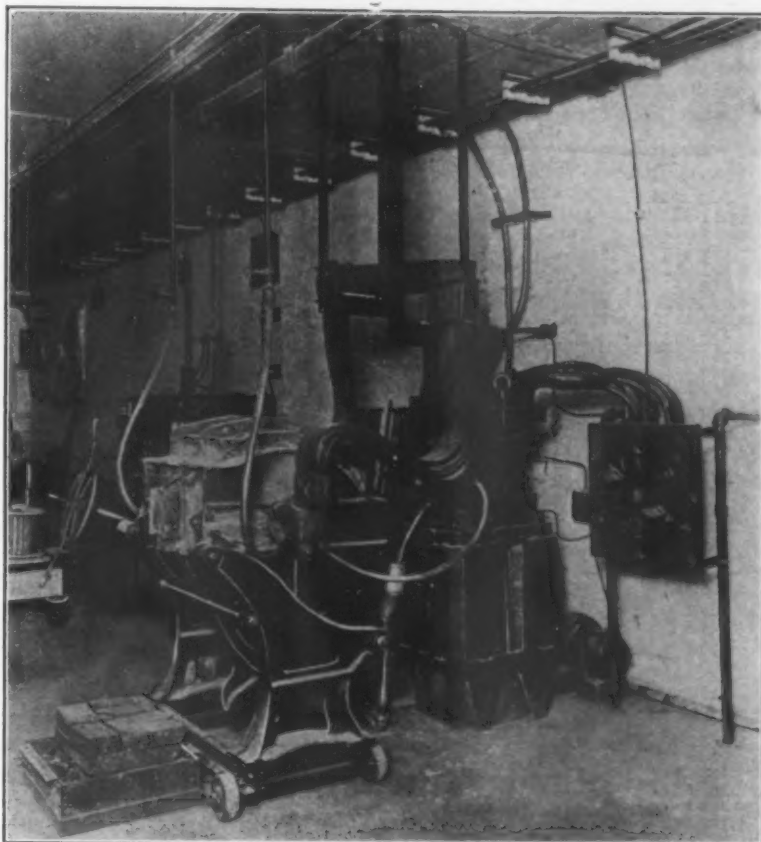
The arrangement is briefly the connection of the furnace unit through the ends of the electrodes; these are in contact with water boxes attached to bus bars

running back to the transformer, which is set directly in back of the furnace with tap arrangements connected with a radial type switch. This switch provides for a wide range of temperature control. The furnace is lined with standard magnesite brick both in roof and hearth, and is of the stationary or nose tilt type allowing for pouring directly from the furnace into molds.

A novel arrangement has been worked out to allow for maximum utilization of the power available. With each transformer setting there has been supplied two furnaces, each unit being set upon a truck. After the heat has been completed, the bus connections are disconnected by the loosening of

two bolts and the furnace is moved from in front of the transformer and a new furnace previously charged is moved into its place. The entire operation requires about 5 min. This allows for maximum production in relation to horse power connected load.

It is quite universal practice for power companies to charge for a connected load notwithstanding the percentage of production in relation to the connected load. Therefore it is of advantage to the customer to be able to work his plant to the maximum point of that connected load.



The Ryan Furnaces Are Located on Trucks So That as Soon as the Melting Is Finished in One Furnace Another One Can Be Put in Its Place in Front of the Transformer. In this way one transformer suffices for two or more furnaces

New Installations of Electric Brass Melting Furnaces

The Detroit Electric Furnace Co., Detroit, has arranged to supply a 2000-lb., 300-kva. Detroit electric brass melting furnace for the Ford Motor Co. at Highland Park, Mich. This furnace when installed will complete a battery of eight 2000-lb. furnaces in the brass foundry of the company. These furnaces are expected to handle the entire brass melting requirements of the Ford organization. The Detroit company is also installing a battery of three furnaces in the plant of the Neptune Meter Co., Long Island City, N. Y., which manufactures water meters.

Other installations now being made by the Detroit

Electric Furnace Co. are one 2000-lb. furnace in the plant of the Tottenville Copper Co., Staten Island, N. Y., and one 500-lb. furnace in the United States Arsenal, Watertown, Mass. With the exception of the furnace at the Watertown Arsenal all of the installations above mentioned are equipped with automatic electrode control, thus to eliminate the necessity of an operator in attendance at the furnace.

Examinations for associate automotive engineer, applications to close Dec. 26, and for assistant engineer of the Patent Office, Jan. 10, 11 and 12, are announced by the United States Civil Service Commission, Washington, to which application should be made.

Slight Gain in Iron and Steel Exports

October Figures 3449 Tons Above September But Below Every Preceding Month Since November, 1921—
Rails and Pipe Lead

WASHINGTON, Dec. 5.—Exports of iron and steel in October, 132,924 gross tons, valued at \$14,626,411, represented a gain of 3449 tons over September. The corrected total for that month being 129,475 tons, thus making it the lowest since November, 1921. Exports of machinery in October showed a slight gain over September, the respective monthly values being \$19,189,666 and \$19,160,208. Compilation of import figures covering the period from Sept. 21, when the Fordney-McCumber tariff act went into operation, through

the fact that importers in that country evidently had laid in good-sized stocks and are supplying requirements from them rather than through new purchases. The largest export movement in October consisted of 20,202 tons of steel rails. Of this total Cuba took 6708 tons and Japan 6289 tons.

Machine tools exported in October numbered 1656, with a value of \$322,900, as compared with 1448 tools

Exports, January, 1920, to October, 1922, Inclusive

	All Iron and Steel	Gross Tons Pig Iron	Semi-finished Material
*Average, 1912 to 1914	2,406,218	221,582	145,720
*Average, 1915 to 1918	5,295,333	438,462	1,468,026
Calendar year 1919...	4,239,837	309,682	258,907
Fiscal year 1920...	4,212,732	248,126	288,766
Calendar year 1920...	4,961,851	217,958	216,873
January, 1921	547,394	3,710	315
February	393,328	1,307	92
March	230,635	2,320	1,023
April	162,592	1,234	678
May	142,551	2,541	749
June	119,081	1,689	1,106
Fiscal year 1921....	4,168,619	129,541	82,549
July	86,523	2,744	363
August	75,827	2,424	2,447
September	95,169	3,078	1,318
October	106,582	2,830	153
November	122,290	1,299	1,869
December	134,415	2,550	250
Calendar year 1921..	2,213,042	28,305	10,363
January, 1922	160,920	1,043	4,683
February	133,975	1,430	6,627
March	208,843	2,724	10,002
April	198,830	2,750	9,376
May	230,062	3,897	13,091
June	212,295	1,996	13,178
Fiscal year 1922....	1,721,418	28,330	63,127
July	157,169	1,943	10,149
August	145,640	1,791	9,353
September	129,475†	5,203	6,810
October	132,924	1,553	8,364
Ten months	1,708,323	24,320	91,595

*Calendar years. †Revised.

October, has been delayed owing to the readjustments of the schedules made necessary by lack of help in the Bureau of Customs, Treasury Department, and by the new classification. The Department of Commerce has announced that the figures will not be ready until the latter part of December.

The October export figures show that Canada has regained her position as the principal foreign market for American steel products. At the same time the figures show that Japan, which for a period recently was the leading export market, has dropped back and is buying comparatively small lots. This is attributed partly to financial conditions in Japan and partly to

The following tables show some of the principal destinations of American iron and steel exports in October:

Steel Bars	Gross Tons	Galvanized Sheets	Gross Tons
Quebec and Ontario.	4,978	Quebec and Ontario.	2,267
Cuba	904	Chile	623
		Mexico	555
		Cuba	530
Steel Rails		Black Steel Sheets	
Cuba	6,708	Quebec and Ontario.	3,595
Japan	6,289	Japan	1,993
Quebec and Ontario.	1,489		
Galvanized Wire		Tin Plate	
Australia	1,646	Quebec and Ontario.	1,737
Argentina	1,588	Japan	1,636
Quebec and Ontario.	961	Argentina	733
Barbed Wire			
Argentina	1,509		
Australia	1,120		

Number and Values of Machine Tools Exported in September and October

	September, 1922 Number	Value	October, 1922 Number	Value
Lathes	67	\$54,874	80	\$57,161
Boring and drilling machines.	93	40,628	166	34,262
Planers, shapers and slotters.	13	15,758	12	38,256
Bending and power presses...	21	11,085	12	7,179
Gear cutters	26	14,667	52	982
Milling machines	27	29,662	50	69,383
Sawing machines	23	5,041	10	1,800
Thread cutting and screw machines	42	22,924	16	7,464
Punching and shearing machines	18	7,171	49	14,977
Power hammers	27	20,886	9	10,386
Rolling machines	2	3,897	2	786
Wire-drawing machines	1	81	7	935
Polishing and burnishing machines	7	1,265	4	1,284
Sharpening and grinding machines	1,081	56,468	1,187	78,044
Total	1,448	\$284,407	1,656	\$322,900

valued at \$284,407 in September. Sharpening and grinding machines to the number of 1187 valued at \$78,044 and boring and drilling machines to the number

Exports of Iron and Steel—Gross Tons

	October 1921	1922	10 Months Ending October 1921	1922
Pig iron	2,723	1,553	23,524	24,320
Ferromanganese	10	5	614	1,059
Ferrosilicon	97	78	318	444
Scrap	3,293	4,510	30,494	59,813
Ingot, blooms, billets, sheet bar, skelp....	153	8,364	8,244	91,595
Iron and steel bars	5,961	9,659	179,654	148,416
Alloy steel bars*	292	292	...	3,698
Wire rods	1,330	1,180	13,305	37,696
Plates, iron and steel..	15,301	4,303	318,661	81,286
Sheets, galvanized ...	3,060	7,520	48,629	96,219
Sheets, black steel....	20,930	6,256	122,115	204,144
Sheets, black iron....	618	452	11,173	9,971
Hoops, bands, strip steel	1,673	2,969	17,466	27,928
Tin plate, terne plate, etc.	5,504	6,324	90,176	66,226
Structural shapes, plain material	10,587	11,151	276,595	107,847
Structural material, fabricated	542	3,596	9,249	38,731
Steel rails	9,976	20,202	292,138	240,674
Rail fastenings, switches, frogs, etc.	462	3,747	7,426	30,730
Boiler tubes, welded pipe and fittings	13,476	15,000	323,534	148,526
Cast iron pipe and fittings	1,953	2,629	44,846	22,117
Plain wire	2,087	8,894	60,369	100,306
Barbed wire and woven wire fencing	3,621	6,711	26,160	63,222
Wire cloth and screening* .....	...	128	...	1,273
Wire rope and cable*...	...	512	...	3,959
Wire nails	1,805	2,131	21,016	48,967
All other nails and tacks	573	531	4,973	7,173
Horseshoes	41	72	509	802
Bolts, nuts, rivets and washers, except track	806	1,888	22,223	15,158
Car wheels and axles†	...	1,238	...	13,868
Iron castings† .....	...	706	...	8,247
Steel castings† .....	...	193	...	1,906
Forgings† .....	...	114	...	1,849
Machine screws† .....	...	16	...	161
Total	106,582	132,924	1,953,414	1,708,323

*Not reported separately prior to January, 1922.
†Previous to January, 1922, reported by value only.

of 166 valued at \$34,262 represented the largest items as to numbers that were exported in October. By value the largest machinery item consisted of agricultural

MACHINERY EXPORTS
By Value

	October, 1921	October, 1922	Ten Months Ending October, 1921	October, 1922
Locomotives.....	\$3,509,440	\$355,777	\$28,958,940	\$7,573,556
Other Steam Engines.....	362,969	90,554	1,683,686	1,854,426
Boilers.....	146,216	220,162	4,467,079	1,067,001
Accessories and Parts.....	29,589	290,816	2,531,076	2,531,076
Automobile Engines.....	92,553	346,163	1,482,701	4,561,640
Other Internal Combustion Engines.....	156,597	374,539	5,028,373	3,562,202
Accessories and Parts for.....	.....	265,290	.....	2,291,421
All Other Parts of Engines.....	564,865	.....	10,807,714	.....
Complete Tractors, except Agricultural.....	74,298	12,350	5,708,363	116,205
Electric Locomotives.....	236,845	.....	1,743,722	.....
Other Electric Machinery and Apparatus.....	1,798,655	425,755	25,255,707	6,734,249
Excavating Machinery.....	161,568	.....	2,205,832	.....
Concrete Mixers.....	29,589	27,485	540,391	479,746
Road Making Machinery.....	117,844	.....	883,209	.....
Elevators and Elevator Ma- chinery.....	78,450	.....	1,850,857	.....
Mining and Quarrying Ma- chinery.....	306,173	647,678	6,889,713	8,853,318
(a) Well Machinery.....	534,258	363,396	3,591,411	3,591,411
Pumps.....	146,128	503,660	11,224,482	4,944,770
Lathes.....	.....	57,161	2,789,777	628,933
Boring and Drilling Machines.....	.....	34,262	.....	470,988
Planers, Shapers and Slotters.....	.....	38,256	.....	247,795
Bending and Power Presses.....	.....	7,179	.....	280,966
Gear Cutters.....	.....	983	.....	92,818
Milling Machines.....	.....	60,389	.....	312,924
Sawing Machines.....	.....	1,800	.....	38,231
Thread Cutting and Screw Machines.....	.....	7,464	.....	147,509
Punching and Shearing Ma- chines.....	.....	14,977	.....	134,655
Power Hammers.....	.....	10,386	.....	106,485
Rolling Machines.....	.....	786	.....	159,802
Wire-drawing Machines.....	.....	935	.....	12,382
Polishing and Burnishing Ma- chines.....	.....	1,248	.....	12,918
Sharpening and Grinding Ma- chines.....	89,272	78,044	1,090,230	653,847
Other Metal Working Ma- chinery and Parts of.....	445,531	370,403	14,310,171	4,603,611
Textile Machinery.....	1,724,940	579,217	16,584,195	12,146,945
Sewing Machines.....	445,228	868,502	6,209,425	5,592,616
Shoe Machinery.....	65,554	82,593	1,602,198	833,475
Flour-Mill and Gristmill Ma- chinery.....	129,638	47,385	1,495,470	917,942
Sugar-mill Machinery.....	667,445	625,033	14,803,253	3,064,780
Paper and Pulp Mill Machinery.....	175,138	.....	2,457,153	.....
Sawmill Machinery.....	22,208	43,120	976,156	514,812
Other Woodworking Machinery.....	72,589	100,663	2,362,868	1,137,414
Refrigerating and Ice Making Machinery.....	147,709	112,211	1,563,498	1,519,032
Air Compressors.....	185,287	178,304	3,616,416	1,771,543
Typewriters.....	956,240	882,160	10,716,432	9,405,584
Power Laundry Machinery.....	56,994	51,255	844,207	552,413
Typesetting Machines.....	254,278	423,720	3,072,236	3,188,015
Printing Presses.....	377,115	365,227	6,892,238	2,992,754
Agricultural Machinery and Implements.....	1,118,829	1,650,776	35,963,657	19,398,206
All Other Machinery and Parts.....	7,420,472	8,562,597	135,643,711	76,834,162
Total.....	\$22,690,915	\$19,189,661	\$371,724,060	\$195,934,578

machinery and implements, the October total amounting to \$1,650,776. The value of typewriters was \$882,160, of sewing machines \$868,502, of mining and quarrying machinery \$647,678, of sugar mill machinery \$625,033, of textile machinery \$579,217, and of pumps \$503,660. No other item reached \$500,000.

Chief countries of destinations of October and September, 1922, iron and steel exports, stated in gross tons:

	October	September
Canada.....	44,815	41,417
Japan.....	15,675	22,328
Cuba.....	14,161	7,656
Argentina.....	10,141	4,145
Mexico.....	8,416	6,193
Australia.....	5,549	2,403
Colombia.....	4,121	2,303
United Kingdom.....	3,837	4,306
Brazil.....	3,575	6,133
India.....	2,888	2,909
Peru.....	2,759	1,562
China.....	2,529	5,689
Chile.....	2,292	4,229
Honduras.....	1,611	.....
Philippine Islands.....	1,193	2,224
Chosen (Korea).....	1,134	3,403
British West Indies.....	1,131	.....
Venezuela.....	971	1,304
South Africa.....	819	979
Uruguay.....	570	.....

*Indicates less than 500 tons.

Of the amounts given above, 54,842 tons went to North American countries in October, against 47,610 tons in September; 24,429 tons to South America, against 19,676 tons; 22,226 tons to Asia, against 34,329 tons; 15,292 tons to West Indies, against 7656 tons; 6742 tons to Oceania, against 4627 tons; 3837 tons to Europe, against 4306 tons; 819 tons to Africa, in October, against 979 tons in September. It will be noted that the Continent of Europe is not represented, no country there having been sent so much as 500 tons.

BRITISH FOREIGN TRADE

October Steel Exports Largest Since July, 1920—
Imports Heaviest of the Year

The October official data on British foreign trade in steel and iron show that the total exports were 354,595 gross tons, or the largest since July, 1920, when they were 393,016 tons. This is an increase of 65,251 tons over September. The October exports make the average for the first 10 months 281,803 tons per month. Exports of scrap are included. To Nov. 1, this year, total exports have been 2,818,035 tons against 1,325,243 tons for the same nine months in 1921.

The October imports were 100,252 tons, or the heaviest for the year, those in January having been 100,178 tons. The average for the first 10 months of this year is now 78,248 tons per month. These data also include scrap. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
October.....	354,595	100,252
Aver. per month, first quarter, 1922.....	267,047	82,536
Aver. per month, second quarter, 1922.....	274,830	67,785
Aver. per month, third quarter, 1922.....	274,347	74,360
Aver. per month, 1921.....	144,885	152,734
Aver. per month, 1920.....	274,881	128,685
Aver. per month, 1919.....	188,519	50,801
Aver. per month, 1913.....	420,757	195,264

The following table covers the principal exports:

Principal British Exports, Gross Tons

	Average per Month		October	
	1913	1921	1921	1922
Pig iron	78,771	8,602	7,614	119,288
Steel rails	41,676	14,698	14,864	17,146
Steel plates	11,162	10,673	7,544	6,551
Galvanized sheets	63,506	17,635	32,222	39,487
Steel bars	20,921	8,927	10,711	22,107
Tin plates	41,208	18,873	25,356	35,125
Black plates	5,679	1,178	1,382	7,154
Steel sheets .....	.....	.....	3,768	14,181
Total exports, first 10 months, 1922.....	.....	.....	.....	2,818,035
Total exports, first 10 months, 1921.....	.....	.....	.....	1,325,243

The most marked recovery in the October exports this year over those in October, 1921, has been in pig iron, galvanized sheets, steel bars, steel sheets and tin plates.

Pig iron imports in October were 16,404 tons compared with a monthly average in 1921 of 55,564 tons.

Iron ore imports in October were 325,183 tons which compares with a monthly average in 1921 of 157,298 tons.

Manganese ore imports in October were 62,320 tons. Last year they were 14,405 tons per month and in 1913 they were over 50,000 tons per month.

American Malleable Castings Association to
Meet at Cleveland in Foundry Week

Robert E. Belt, secretary-treasurer of the American Malleable Castings Association, advises that a joint meeting of the western and eastern sections of the association will be held in Cleveland in connection with the annual convention of the American Foundrymen's Association.

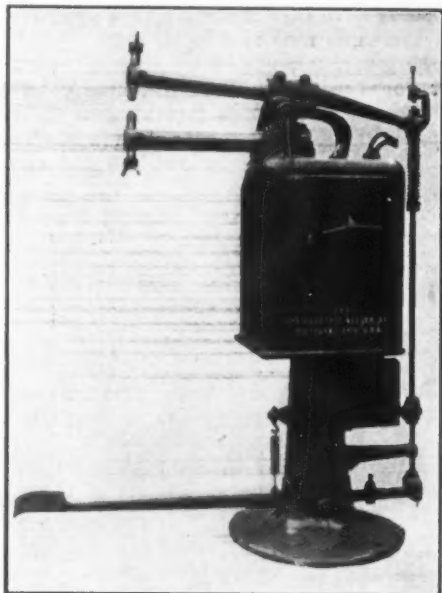
The meeting probably will be held on Wednesday, May 2, and the technical program of the American Foundrymen's Association malleable session will be arranged so as to meet the convenience of the members of both associations. It will be a notable week for the men of the malleable castings industry, who through their organization have made important contributions to technical research.

Four of the new sheet mills which are being installed by the Newton Steel Co., Youngstown, at its Newton Falls, Ohio, plant will be completed and ready for production in January, according to current developments. The additional capacity will be largely devoted to production of full finished sheets for automobile body and fender and metal furniture stock.

The Chicago Hardware Foundry Co. has reopened its Elkhart, Ind., plant which has been idle since January, 1921. The Elkhart foundry was purchased from the Concord Foundry Co. in 1919.

Machine for Welding Light and Medium Stock

An improved welding machine, designated as the type SAF, intended for use on light and medium stock has been placed on the market by the U. S. Electric Welder Co. It can weld rough oxidized as well as smooth stock. About 4 sec. per weld is required for 3/16 in. material, and the production of two 1/16 in. bright sheet steel is 4000 welds per hour. Two sizes, having kva. capacities of 12.5 and 18 and horn sizes of 2 and 2 1/4 in. respectively, are available. Horns of various lengths may be provided. The illustration



Improved Welder for Light and Medium Stock

shows the 12.5 kva. size, equipped with a 12 in. horn, the same machine equipped with motor being designated as the type SAM.

The machine is equipped with the company's transformer. The internal automatic reactance prevents breakdown at overload and permits the handling of heavy stock without overheating. It is also said to increase output considerably. The automatic switch is equipped with magnetic blowout, removable contacts and is entirely inclosed. A five-point pivot switch provides different voltages at the welding point, which is water cooled. Mechanical parts of a special alloy or cast steel, and because of heavy construction, extra heavy pressure on the points can be obtained when desired. All conductors carrying line voltage are inclosed. Gitz oilers are provided where required.

Coal and Coke Production

WASHINGTON, Dec. 5.—Estimated production of bituminous coal for the week ended Nov. 25, including coal coked, mine fuel, and local sales, was 11,038,000 tons, according to the Geological Survey. Preliminary returns of cars loaded the first three days of Nov. 29-Dec. 2, indicate that production continued at about the same rate, but on account of the Thanksgiving Day holiday the total output will probably drop to 9,300,000 and 9,700,000 tons.

Production of beehive coke in the week ended Nov. 25, showed a gain of 8 per cent over that in the preceding week. The total output as estimated on the basis of cars loaded was 285,000 tons the week before. The cumulative output during 1922 to date stands at 6,598,000 net tons. In the corresponding period of the four years preceding, it was: 1921, 4,936,000; 1920, 19,193,000; 1919, 17,822,000; 1918, 28,149,000. Thus it is shown that from the viewpoint of beehive coke production the year 1922 is 77 per cent behind 1918, 63 per cent behind 1919, 66 per cent behind 1920, and 33 per cent ahead of 1921.

The movement of bituminous coal from Lake Erie ports declined to 828,949 net tons in the week ended Nov. 26. In comparison with the week preceding this

was a decrease of 21 per cent and was the lowest tonnage dumped since the week ended Sept. 11. Of the total dumpings 797,211 tons were cargo coal and 31,738 tons were vessel fuel.

In comparison with the three years preceding, the total shipment of cargo coal is now 21 per cent behind 1921, 20 per cent behind 1920 and 18 per cent behind 1919.

Indiana Foundrymen Organizing

An organization meeting of Indiana foundrymen was held at Purdue University, Lafayette, Ind., Nov. 24 and 25, to bring the foundrymen of the State closer together, for discussion of problems affecting the industry. Arthur J. Tuscany, secretary-manager of the Ohio State Foundrymen's Association, explained the workings of his association and it is probable that an Indiana association will be patterned after it. A number of interesting papers were read and discussed. Prof. R. E. Wendt, Purdue University, discussed "Foundry Conditions in Indiana"; F. D. Chase, Chicago, described "The Lay Out and Design of a Modern Foundry"; H. P. Northrup, Indianapolis, described "The Manufacture of Pig Iron" and N. M. Waterbury, Indianapolis, "The Manufacture of Malleable Iron." David E. Ross, W. M. Klingman, Prof. J. F. Keller and E. T. Runge also addressed the meeting.

Polishing and Buffing Lathe

A ball-bearing heavy-duty polishing and buffing lathe designated as the No. 86, and constructed as shown in the accompanying illustration has been placed on the market by the Connecticut Dynamo & Motor Co., Irvington, N. J. It is designed to permit placing the countershaft or line shaft on the floor behind the lathes and still have the belt and pulleys on the lathe fully covered for the protection of the operator. The hood may be revolved to permit belting from any angle and the belt shifter follows the belt and is always in the right position.

The spindle is 48 in. long overall, 2 in. in diameter between bearings, 1.77 in. in diameter in the bearings, and 1 1/4 in. in diameter between flanges. The distance between wheels is 36 in. and height to center line of spindle 38 in. The diameter of flanges is 6 in. The tight pulley is 6 in. in diameter, 4 1/2 in. face and the loose pulley 5 1/4 x 4 1/4 in. The maximum wheel thickness is 4 in. The size of the base at the floor is 20 x 24 in. and the weight 550 lb. net.



The Hood May Be Revolved to Permit Belting from Any Angle

C. H. Wills & Co., Marysville, Mich., manufacturers of the Wills-St. Claire car, have been granted a friendly receivership through the United States courts by the appointment of the Security Trust Co., Detroit, as receiver. The Michigan Malleable Iron Co., Detroit, instituted proceedings in behalf of the company. The application for a receiver came after many conferences with most of the principal creditors and Eastern bankers. Although the company is said to be solvent, this process was deemed expedient in order to re-finance and conserve the best interests of all concerned.

The Board of Water Supply, Municipal Building, New York, will take bids until Dec. 19 for the Mount Prospect conduit line, Catskill Aqueduct, consisting of about 10,530 ft., 72 in. steel pipe; 6,270 ft., 66 in. steel pipe; 360 tons of cast iron pipe and special castings, meters, valves and other appurtenances. Benjamin F. Einbiger is secretary.

CONTENTS

December 7, 1922

Polish Machinery Industry Shows Revival1483

American Observer Finds Signs of Progress—Contrasts Between Conditions Today and in 1909—Prospects for Export Trade

Efficiency of Electric Power Supply1487

Improvement Depends Upon Making the Best Use of Existing Facilities and Choosing Carefully the Source of Power

Temperatures at Which Physical Changes Occur1492

Fusion, Melting and Vaporization of Metals and Other Substances—Table of Temperatures for Producers and Users of Iron and Steel

Casting Steel Ingots Centrifugally1494

Results from Using a Horizontal Bottle-Neck Mold—Comparison with Earlier Attempts—Excellence of Ingots and Their Cost

A Review of Steel Mill Electrification1497

Ability of Motors to Take Heavy Overloads Important—Efficiency, Flexibility, Durability and Low Operating Costs Noted

Slight Gain in Iron and Steel Exports1508

October Figures 3449 Tons Above September But Below Every Preceding Month Since November, 1921—Rails and Pipe Lead

Pig Iron Production in November1520

Daily Output 9898 Tons More Than in October—Gain of 24 Active Furnaces

Facing and Centering Machine.....	1486
The Speed of the Dollar.....	1489
Electric Truck and Portable Elevator...	1489
New Industrial Leadership.....	1490
Employment in Cleveland.....	1490
Coming Meetings	1490, 1500, 1509
Charles A. Coffin Foundation.....	1490, 1518
Crane of Unusual Proportions.....	1491
Rapid Wage Advances in German Metal-working and Building Trades.....	1491
Oppose Radical Bill.....	1492
Heavy Type 60-In. Swing Lathe.....	1496
Annealing of Gray Cast Iron.....	1499
Coke Production Large.....	1500
Milton O. Knauss Buys Blast Furnace..	1500
Truck Loader Mounted on Truck Chassis	1501
Plant Operations	1501
Youngstown Merger Rumors.....	1501
Automatic Drill for Light Operations...	1502
Duplexing with Electric Furnaces.....	1502
Reel for Use with Portable Grinder....	1502
Cylinder Boring Machine.....	1503
Clock Dial for Control Under Manufacturing Budget	1503
Critical State of South Russian Metal Industry	1503
Large Split-Pattern Molding Machine...	1504
Railroad Situation Improving.....	1504
Book Reviews	1505
New Books Received.....	1506
High Temperature Melting.....	1507

British Foreign Trade.....	1509
Machine for Welding Light and Medium Stock	1510
Coal and Coke Production.....	1510
Indiana Foundrymen Organizing.....	1510
Polishing and Buffing Lathe.....	1510
Editorials	1512
Steel Output for 1922—A Glaring Exception—Duplexing with Electric Furnaces—Revival in British Steel—Government by Public Opinion.	
Correspondence	1514
Device for Cleaning Old Machinery.	
Manufacture of Brass Tubes.....	1515
Czechs Face Collapse.....	1516
Lake Superior Iron Ore Shipments for 1922	1516
Mechanical Engineers' Meeting.....	1517
To Reorganize Jones & Laughlin Steel Co.	1518
Relieving Industry of Burden.....	1518
New Wickwire-Spencer Factor.....	1519
Ore Rate Case Lost.....	1519
British Iron and Steel Market.....	1536
Standardized Terminology in Industry...	1536
Fabricated Steel Business.....	1538
Railroad Equipment Buying.....	1538
German Prices Sky-Rocket.....	1539
New Trade Publications.....	1541
Steel and Industrial Stocks.....	1551
Industrial Finance	1502, 1551
Plans of New Companies.....	1552
Trade Changes	1553

Iron and Steel Markets	1522
Comparison of Prices	1523
Non-Ferrous Metal Market	1535
Prices Finished Iron and Steel, f. o. b. Pittsburgh.....	1537
Personal Notes	1540
Obituary Notes	1540
Machinery Markets and News of the Works	1542
New York Jobbers' Prices	1554

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

C. S. BAUR, *General Advertising Manager*

Member of the Audit Bureau of Circulations and of

Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

E. J. Frank, *President*

PRINTED IN U. S. A.

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Sweetland, *Pres.*, Charles G. Phillips, *Vice-Pres.*, A. C. Pearson, *Treas.*, F. J. Frank, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building

Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Buffalo: 881 Ellicott Square. Washington: 26 Jackson Place, N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W.1. Subscription Price: United States and Possessions, Mexico, Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single copy 25 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

Steel Output for 1922

Estimates made two months ago of the probable steel output of the country in 1922 need some revision upward in view of the high rate of production maintained in November and the indicated rate for December, winter blockades before January being rare. There is a probability, in view of an 80 per cent ingot production through half of November, and the high rate that is looked for this month, at least up to the holidays, that the year's steel ingot output will be not far short of 33,000,000 tons, or more than 63 per cent of capacity, assuming the latter to be 52,000,000 tons. With 19,224,000 tons of ingots 1921 was rated a 37 per cent year. Thus 1922 promises to be about 70 per cent better in point of tonnage.

While the Steel Corporation has been credited with about 45 per cent of the country's steel capacity, it actually produced about 55 per cent of the total in 1921, entering that year with a good order book, while the independent companies then had little business ahead and were curtailing production sharply. In 1922 the Steel Corporation's output is likely to be less than 50 per cent of the total, probably but little more than 48, estimating that it reaches 16,000,000 tons out of a probable total of 33,000,000 tons.

A Glaring Exception

To the general rule that restraint of trade is not permitted because it is unlawful there has been growing up a glaring exception, the restraints that arise from the operation of labor unions. It may help to broaden the viewpoint to recall that it was several decades before the discovery of America that English courts recognized the rule that a contract by which a man bound himself not to engage in any branch of trade or labor was unenforceable, the principle being that the man might be disabling himself and thus might become a charge upon the community. Long afterward exceptions began to be developed, these exceptions being clearly defined and covering only cases where the agreement was strictly incidental in some much broader transaction. These are the

cases to which is legally applied the often loosely used "reasonable restraint of trade."

The restraint is still fully recognized and where the agreement may not be indictable it is still unenforceable. The principle is in full effect, that a man may not restrain himself from engaging in certain business or labor. Despite this well-established fact we have the glaring exception that labor unions restrict their members as to the quantity of work they may do in a day, and bring about conditions whereby there are long periods of idleness.

In the case of the coal miners, one may exclude wholly from the argument the question whether the conditions existing in the coal industry have represented a restraint of trade under our present laws, and yet find that the coal miners have passed into the condition against which the rule recognized six centuries ago was directed. The danger was to be avoided, of a man becoming a charge upon the community. Is not that precisely the position militantly taken by the coal miners? They are here, they receive employment only so many hours a year, much fewer than men are ordinarily expected to work, and they have got to be kept.

In the building trades, in coal mining, or in anything else, whenever and wherever men refuse to do a reasonable amount of work, whether by limiting the rate of performance, requiring the employment of unnecessary helpers, subdividing work to different trades, striking, or any of the other devices used, they are making themselves charges upon the community. The actual and recognized result is that the community pays undue prices for transportation, for construction work and for coal and other commodities. From basic principles, what is the defensible difference between the community supporting by taxation a man in an almshouse and supporting him in partial idleness by paying too high prices for transportation, for construction or for goods? Practically the difference is that the one class of contracts in restraint of trade to which reference is made can be prevented by making the contracts unenforceable, while the other cannot, under our present system, for the reason that the men practicing the

restraint do the enforcing themselves, not requiring aid of the law.

It may require much time and much talk for public sentiment to come to a full realization of the glaring exception and to correct the abuse. But that public sentiment eventually will reach that point is an entirely reasonable expectation.

Duplexing with Electric Furnaces

Making steel by a duplex electric process is novel and so far as known is not practiced in the United States. On another page reference is made to an English operation of this sort. There are certain advantages in using two electric furnaces, one for melting and partial refining and one for finishing, but it is a question whether the advantages are not outweighed by the expense. Unless electric power is very cheap, preliminary melting and refining can be as advantageously and more cheaply accomplished in basic open-hearth furnaces, even when scrap is a very large factor. For this reason duplexing has not been done entirely with electric furnaces in this country. A conspicuous example of domestic practice is the naval ordnance plant at Charleston, W. Va., where basic open-hearth steel is finished in the largest electric furnaces in the world. Undoubtedly in the United States coal and oil are cheaper melting mediums than electricity and carbon electrodes. One of the drawbacks to the British electric steel industry has been high-cost electricity and there is reason to expect that British experience will parallel the American, though it is possible that the Stobie plan may fit in where small quantities of several kinds of high-grade steel are wanted.

It is recalled that in 1911 Girod made steel by a similar process in southern France, so that the British patent is not entirely new. Original plans of the Ford company's new steel plant involved electric duplexing, or the finishing in small electric units of steel partially refined in very large ones. But it may turn out that even in this case preliminary work may yet be done in the open-hearth.

Revival in British Steel

Betterment in the steel industry of Great Britain is indicated by the October statistics of both production and foreign trade. The output of both pig iron and steel reached in that month the highest rate for the year at 481,500 tons and 565,200 tons. The marked change that has come over the industry is represented by an October pig-iron production over twice the monthly average in 1921, and yet only 56 per cent of the average 1913 monthly production. In steel the showing is better. October production was nearly twice the monthly average in 1921 and about 90 per cent of that for 1913.

The October steel exports, given in detail elsewhere, show a surprising recovery of foreign markets. At 354,600 tons the movement was not only the largest this year but the best since July, 1920, being 85 per cent of the great record of 1913. There was an increase of about 65,200 tons over

September, but 50,000 tons of this was pig iron, most of which came to the United States. From the data at hand this means an exportation to the United States in ten months of about 159,000 tons of pig iron. Thus the recent exportation of British pig iron exceeds any previous record—even the heavy movement in 1912 and 1913—and with less than half the blast furnaces operating. Exports of steel bars and black sheets this year already exceed the pre-war rate, while the demand from other countries for galvanized sheets and tin plates has been nearly equal to what was required as a normal peace-time demand.

The British recovery in steel exports is in sharp contrast with the experience of this country. Here all the progress has been in production while the export movement is now the smallest in many years. In Great Britain increased production has been due largely to foreign demand; in the United States nearly all the steel has been taken up at home and exports have sunk into insignificance. While the readjustment of the British industry has been and is slow, conditions are approaching normal. A favorable factor is that the war increase in capacity was relatively not so large as that with which the American industry sooner or later must reckon.

Government by Public Opinion

More than a third of a century ago there was a loud public outcry against the railroads, against their watering of stock, giving of rebates, naming of rates on the principle of "all the traffic will bear," and various other things. It is not overstating the case to say that public opinion was very much against the railroads. The railroads objected strongly to the passage of the original interstate commerce act in 1887. They objected to its enforcement and by diligently pursuing the matter in the courts they succeeded in making the act have less effect than its friends thought it would have.

When the courts decided that the Interstate Commerce Commission could declare a given rate unreasonable but must not volunteer to mention a rate it would consider reasonable, the common feeling was that it was going to be very difficult to bring about real regulation of rates. Yet it is probably entirely correct to say that in all those years "public opinion" was that the condition was bad and that there ought to be regulation.

During the first decade of the present century there was much public sentiment against what was called "big business." The popular desire appeared to be that as many large corporations as possible should be eliminated by dividing them into small pieces and that those that could not be caught in that way should be very closely regulated. It was the declared purpose of the Roosevelt and Taft administrations to bring about "old-fashioned competition."

Yet with all the time that has elapsed there have been few dissolutions and there has not been established by law the regulation as to selling prices that seemed to be popularly demanded. At the same time the public feeling against large

corporations has subsided. There has been some legislation, it is true, in the Clayton and Trade Commission acts, and there have been decisions under the Sherman law which give the public a much clearer grasp of what the act means and does than it had ten years ago. One has only to recall some of the talk there was ten years and more ago, however, to be convinced that the sort of regulation then demanded has not been established and that the sentiment in favor of that kind of regulation has largely died out.

Considering the trend of public feeling on other subjects it would be idle to assert that the public conscience or the public desire has changed. The changes that have occurred are that large corporations have become more careful, and have even become punctilious, as to what they will do or will not do, while the public has learned that the large corporations were not so bad as it thought.

In very large measure we have government by public opinion in this matter. The larger the corporation or the more public its business, the more particular it is as to its conduct. The contrast between this attitude toward public opinion and the attitude of the railroads a third of a century and more ago toward public opinion is very striking.

But there is another contrast—a contrast between big business and little business. Little business has been profiteering in the past few years and the profiteering is not ended. There are altogether unreasonable profits in many of the items that help to make up the family budget. Furthermore, while the large corporations are efficient and conduct their operations economically, there is much waste in little business. We have too much handling of goods and too much retail shop keeping.

There is much public opinion against these unreasonable profits and these wastes but it does not lead to results. Those who are responsible do not feel that they need care about public opinion. Big business does. The result is that big business is governed by public opinion and little business is not. The care and circumspection of the Steel Corporation's walk and conversation, not only in the more than eight years in which its fate was in the balance, but in the years since the Supreme Court's decision in its favor, have become proverbial in the steel trade. Legislators, progressive and otherwise, may well give up the pursuit of big business for a season while they consider what can be done to bring all other business up to a like degree of compliance with the will of the public.

American makers of tin plate have had a large demand for their product in 1922, with indications of even a greater output in 1923. Importations of pig tin have been on a liberal scale to take care of the needs of the mills in the past year, running well above those of 1913 and being exceeded only in 1920. The monthly average of imports in 1913 was 3879 tons, at an average price of 44.33 cents per pound, New York. To November, this year, imports averaged 4171 tons, with an average price of between 31 and 32 cents and a current

quotation of 36 cents. In 1913 the average price of tin plate was \$3.55 per box, as compared with \$4.75 to-day, and a contract price of \$4.75, though not a maintained price, over the past year. The figures illustrate how other factors than the market price of tin plate have had much to do with making the price of pig tin, though the coating of steel sheets is the largest use to which tin imports are applied, amounting to about 40 per cent of the total.

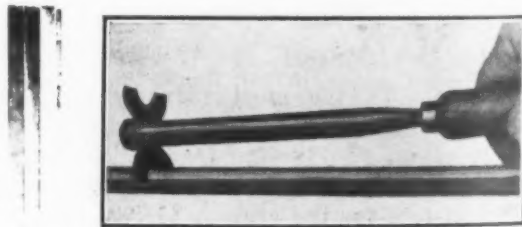
Statistics of Germany's iron and steel export trade for June and July, recently available, show that over 50 per cent of the total of 421,900 tons for the two months consisted of structural material, rails, plates, wire and pig iron in the order named. Rails were 25 per cent of the total, the Argentine taking the largest share. Structural material was widely distributed. Over 40 per cent of the total exports went to six countries, Holland leading and the Argentine and Japan standing next. The figures for these two months are fairly representative of other months of the year, not only in distribution but also as to the total movement, which has averaged close to 200,000 tons per month.

CORRESPONDENCE

Device for Cleaning Old Machinery

To the Editor: The tool shown in the illustration was devised by a warehouse man to facilitate the work of cleaning a number of used machines that had accumulated a covering crust of dirt, composed of a mixture of paste and sand. A regular flat scraper was used to clean the plane surfaces but all the finished cylindrical parts were scraped with the tool illustrated. By the judicious use of emery cloth in three grades, following the scraping operation, the machines were restored to almost the original brightness.

The tool is made up of a piece of $\frac{5}{8}$ -in. rod, a screw and a washer. The rod is drilled and tapped at one end for the screw, the other end being pointed for driving



Tool Facilitates Cleaning Machinery

into a handle. Ordinary washers are used as scrapers and sawed in two, both halves being held as shown by tightening the screw in the end of rod. By holding both halves in this way one half can be used as a roughing tool to break up the dirt surface and the other as a sort of finishing tool to remove it. The washers are sharpened by holding them flat against the side of an emery wheel for a moment. This gives sufficient edge for the purpose intended and yet not cut into the metal. Different sizes of washers are used as required, one size taking care of several diameters of work less than itself. As a guide, a washer having a 1 in. hole is satisfactory to use on round parts from that dimension down to $11/16$ in.

HARRY MOORE.

Rosemount, Montreal, Canada.

MANUFACTURE OF BRASS TUBES

How Various Defects Are Discovered—Methods of Amelioration

Some defects occurring during the manufacture of 70-30 brass tubes were described by W. E. Ballard in a paper read before the Birmingham* University Metallurgical Society. The observations cover actual works practice, and they are based in the main upon experience at the works of the Muntz Metal Co., Ltd., Birmingham. Tubes of 70-30 brass are usually cast in chills and round a core of sand, the casting being annealed and pickled after being trimmed. The tube is then reduced to the required size by a series of drafts on a drawbench, each application of cold work usually being followed by annealing. Failures, therefore, might be classified under the headings of casting, annealing and drafting.

Faults Due to Molding

Failures produced in casting were considered by Mr. Ballard to be due to too little binding material being used in the sand mixture, or to the cores having been dried at too high a temperature, perhaps in the neighborhood of 150 deg. C., in which case they would always show cracks before being placed in the mold. Another cause might be rough handling after leaving the stoves, and to overcome this difficulty the cores are dressed before their final drying with a wash of powdered charcoal in a weak solution of binding material. It has been found that large holes in the tubes are usually due to badly dried cores, or to a spot of water having fallen on the core just before it was placed in the mold.

Mr. Ballard complains that very little work of a scientific nature had been done on the subject of mold dressing, and he said there was a considerable difference of opinion with regard to the oil base. It was a common thing to find as many as four oils combined in the dressing. A dressing recommended to him consisted of Russian tallow, lard or a substitute, seal oil, a little beef tallow, a pinch of resin and charcoal. Whatever oil is used as a base, it would need a certain proportion of thickening matter. If the mixture was too thick, the casting would have a peculiar wavy surface resembling a crocodile's skin. If still thicker, large black marks resembling thumb prints would be seen. If the mixture was too thin, the casting freshly taken from the mold would be a bright golden color in patches and the surfaces of these patches would be honeycombed with small holes.

The question of the influence of the oil base brought up another thorny subject, namely, mold temperature, as to which the practice of various works was widely divergent, the temperature varying from 100 deg. C. to 300 deg. C. If the mold was too hot, the surface of the casting was similar to that found when the dressing was too thin, and if the mold was too cold, the surface of the casting showed dirty patches and was slightly corrugated. The use of lard oil substitute or lard oil itself demanded a cool mold, not above 150 deg. C. Seal oil and cottonseed oil also needed cool molds, though a higher temperature might be attained if a little resin was added. Too much resin gave the casting a shiny hard bluish surface and the mold gradually became covered with a hard metallic skin. Personally he thought it better to use an oil base which gave the biggest latitude of mold temperature, and mineral oils of high flash point undoubtedly had this advantage. It had been suggested that oils of high viscosity at 150 deg. C. might be best for dressing purposes. But the ascertained viscosities of the common oils used in dressing showed that this property was not essential, otherwise castor oil with a viscosity of 390 compared with the 100 of whale oil would make a wonderful dressing. The specific gravity also seemed to be a negligible factor, but either the flash point or the temperature of spontaneous ignition in oxygen did seem to give a fair indication of suitability for dressings. Tar and bitumen were quite good for dressings for heavy castings with a good body of metal, but their partial combustion left

a good deal of dirt. Therefore heavy mineral oils seemed to be as satisfactory as anything.

Defects in the Tube Wall

Internal defects in the tube wall were the most difficult to discover and to cure. At Muntz Metal Co.'s works great care was exercised to avoid faults of this nature. Every day sample castings were taken and burst by being expanded on plugs. The fractures were examined carefully. Another system used there was breaking up castings under a power hammer. He thought bursting by expansion was probably the best method, as fracture then occurred down the line of maximum defects. A tube so fractured proved to be generally porous. Holes were seen all over the fractured surface, some dirty and some with a shiny internal surface. The only possible cause of such a bad defect was too low a pouring temperature.

Mr. Ballard was confident that brass tubes could not be spoiled by overheating within reason, although he was prepared to admit the possibility of casting billets at a slightly lower temperature than 1200 deg. C. By making the casting too thin for its length, slight porosity and general dirtiness of the tube walls were shown on fracture, and he said that cutting down thickness to its limit to save drafts has been the cause of many toolmakers' troubles. A similar defect was shown in castings which were made too long, and he said that a few black holes in the middle of the casting were usually a sign of too rapid pouring and of air in the mold, which was the cause of many spills in the finished tubes.

In discussing defects of molding, Mr. Ballard classified them as falling under the headings of insufficient annealing, overheating and fire cracking. He urged that every annealing furnace should have its pyrometer and if possible a recorder too. Overheating he said was more easily detected as the annealed tube then usually showed a yellowy green bloom due to oxide of zinc. Such samples were sometimes so full of intercrystalline cavities that they broke when dropped on the floor. Their fracture sometimes showed very coarse needle-like crystals. Such tubes seldom stood up to the test of the drawbench. Local overheating sometimes caused a weak area in otherwise good tubes. It was in detecting underheating and overheating that the microscope was most generally useful in a tube works. Sections at right angles to the direction of drawing were usually the most instructive.

Defects Due to Drawing

Mr. Ballard next discussed the effect of drawing on the stability of the finished tube. He considered that there were really only two methods used in drawing a tube. The hollow sinking method was for the adoption of diameter without reducing the wall thickness. In other processes which he called "pinch" the reduction of wall thickness was accomplished by supporting the tube inside with a bar or plug.

A curious phenomenon in connection with hollow-drawn tubes or any tubes having high internal stresses was their behavior when treated with mercurous nitrate solution in various ways. The intensity of internal stresses could be roughly gaged by the time taken for cracks to develop when the stressed article was placed in such a solution. When the outside of a highly stressed tube was treated with the solution cracks developed as quickly as if the tube were immersed completely. If the inside were so treated cracks might not develop for several days. A tube that had been made by a reduction by "pinch" alone would not crack at all in such a solution; it would not firecrack or season crack however much there had been put upon it. Tubes which had been subjected to "pinch" and sink might or might not crack, according to which effect predominated.

Raymond E. Bell has opened offices in the Woolworth Building, New York, Suite 3412, to act as consulting industrial and management engineer. O. H. Blackman, until recently president of the Blackman Co., New York, will join him.

*England.

CZECHS FACE COLLAPSE

Increase of Crown Curtails Exports—Imports Increase—Stinnes Works Undersells Czech Producers

PRAGUE, CZECHO-SLOVAKIA, Nov. 17.—The collapse of the important Czecho-Slovak metal industries supplies a new comment on the theory that currency depreciation is necessarily associated with industrial stagnation. The Czech crown in London, between Dec. 31, 1921, and the middle of this month, rose from 285 to 139 to the pound; but while the steel industry of Germany with declining exchange has prospered, and the output of iron in Poland, also with a declining exchange, has enormously increased, Czecho-Slovakia's iron and steel branch has shared in the general industrial stagnation, which increased the number of unemployed in August to 557,000. Czecho-Slovakia's industries are far too extended for the home market. Since her crown began to rise, the republic as an exporting country has been badly hit by German, and in part by Austrian, under-selling; and the decline witnessed in Germany in 1920, after a temporary exchange recovery, is being repeated in Czecho-Slovakia on a smaller scale.

Of 47 blast-furnaces in old Austria-Hungary, 27 are in Czecho-Slovakia, which has less than a fourth of the population of the former empire. Pig-iron output at full capacity is about 1,500,000 tons, which is a quarter of Germany's present capacity. Since March, 1922, only 5 blast-furnaces have been in blast. The Prague Iron & Steel Corporation had all its 8 furnaces out in late July, and could resume limited production only after obtaining cheap coke from Germany. The last monthly production figures vary between 23,000 and 34,000 metric tons. For steel production there are 42 Siemens-Martin, 5 Thomas and 3 Talbot furnaces, with a total capacity of 2,000,000 tons, operating according to latest reports at 25 per cent, as against 40 per cent at the end of 1921, which was 6 per cent less than in 1920, absolute figures being 917,662 tons against 972,976 tons.

These slump conditions and the moderate fall in living costs led recently to an effort to reduce production costs. Wages were cut 30 per cent and coal and coke from the Ostrau district were reduced 28 per cent. No noticeable increase in sales of iron and steel have so far resulted. Last reports are highly unfavorable. Although Austrian production cost is much higher than German, the Austrian Alpine Montangesellschaft, now under the direction of Hugo Stinnes, has easily undersold Czech producers; overseas orders for Czech steel have ceased; and in Hungary and Jugoslavia, Stinnes has created his own iron and steel trading companies and is fighting Czecho-Slovakia determinedly.

The selling mergers in the Czecho-Slovak steel industry have been completed. In May an agreement for selling output in common was concluded by the Prague Iron company, Berg und Huetten company, Witkowitz company, Oderberg Cable & Wire Co., Hernadthal Ironworks, Rothan-Neudek Ironworks, Radek Ironworks, Eisenwerke der Stadt Rokycan, Zbiro Works, Max Hofgartner Co., Schwartz & Beck, Libschitz Ironworks, Willy Coburg Co., A. Hahen and Freistadt Steel & Iron Works. The cartel at once took steps to increase exports to Austria, and announced that if sales did not improve it would close its less profitable works. The Freistadt works were mentioned as the first due to be closed. M. Josevich, a Czech expert, declares that further closing down cannot be avoided, because in the present state of the international market Czech production at full capacity is much too large. At end of August the cartel reduced iron and steel prices. The Federation of Czech Industries declares that only a radical reduction of the coal tax and of railroad freights can save the situation. The Skoda company, the Bohemian-Moravian Machinery Co., the Kolben Electrotechnical Co., and Wichterle & Kovarik, manufacturers of farm machines, have united to form the "Czech Machine Concern," with branches in Kovno, Rovno, Lemberg and Constantinople.

Export is declining. Exports registered as "base metals and wares thereout" in the first eight months of 1922 was almost the same as in the same months of 1921, but exports of machines were only 20,365 metric tons against 29,132 tons, while imports of iron and iron wares rose from 104,020 tons to 188,458 tons, base metals and wares thereout from 13,993 to 19,977 tons, and machines from 16,216 to 17,305 tons.

Czecho-Slovakia's coal and lignite production have decreased. The latest figures published, for the first fortnight in September, show lower production than at any time since the early part of 1919, when post-war disorganization still reigned. Large stocks of unsalable coal lie about the pit mouths. Between the termination of the industrial boom in March, 1921, and the late summer of this year, 8 per cent of the coal miners have been discharged. Because of the relatively slight drop in wages and the great recovery of crown exchange, Czech cost of living in gold, which in 1921 was 94 per cent of the pre-war cost of living in gold, was lately reported at 195 per cent, while Germany's gold cost of living was only 35 per cent of that of 1914 (at present much less), and Austria's 60 per cent. Such conditions make it impossible for the Czech steel industry to hold its own in export, and only a new decline in crown exchange or a gradual reduction of the whole domestic price-level can restore the industry's competing capacity.

Lake Superior Iron Ore Shipments for 1922

CLEVELAND, Dec. 4.—Iron ore shipments by water from the Lake Superior district during the season of 1922 which closed Dec. 2, amounted to 42,613,184 gross tons. This is a gain of 90.6 per cent over 1921, when the movement was 22,300,726 tons, but shipments last year were the lightest in 17 years, or since 1908. The 1922 movement, however, does not show up well in view of the fact that it fell below the total in eight out of the previous twelve years, starting with 1910. The record year was 1916, when the movement was 64,734,198 tons. Shipments passed the 60,000,000 ton mark during the next two years, dropped back to slightly over 47,000,000 tons in 1919 and climbed up to 58,500,000 tons in 1920. It is estimated that the all-rail shipments this year will amount to approximately 1,000,000 tons.

The following table gives the season's shipments by ports in gross tons and the corresponding figures for 1921:

	Season 1922	Season 1921
Escanaba	4,592,354	1,806,656
Marquette	1,976,220	786,946
Ashland	5,813,207	2,264,705
Superior	11,234,195	4,991,278
Duluth	13,044,771	9,164,803
Two Harbors	5,952,437	3,286,338
Total	42,613,184	22,300,726
1922 increase	20,312,458	

Announcement by the Chicago, Milwaukee & St. Paul Railway Co. that its West Milwaukee locomotive and car repair shops at Milwaukee would close down from Saturday night, Nov. 25, to Friday morning, Dec. 1, for the usual Thanksgiving holiday recess, brought an emphatic protest from the traffic department of the Milwaukee Association of Commerce.

The machinery, stock and equipment of the Thurlow Steel Works, Inc., Fourth and Booth Streets, Chester, Pa., will be offered for sale by E. Wallace Chadwick and Howard M. Lutz, receivers, on Dec. 5, including two 5-ton electric traveling cranes, lathes, grinders, drills, steam hammers and miscellaneous equipment.

Hickman, Williams & Co., Inc., announces the establishment of a scrap division in its Pittsburgh office in charge of J. F. McKillips, assisted by Jay Stephens. Messrs. McKillips and Stephens have been active in the scrap trade for a number of years.

MECHANICAL ENGINEERS MEET

Sessions Include Machine Shop, Materials Handling and Educational Subjects

Sessions under the auspices of the machine-shop division, materials-handling division, management division, committee on education and training for the industries and the research committee, were among the features of the second day of the forty-third annual meeting of the American Society of Mechanical Engineers, held in New York, Dec. 4 to 7. A general session, with A. L. Rice, vice-president of the society, as chairman, was also held.

Particulars of a system of helical gearing designed by him for use on metal planers were given by Forrest E. Cardullo of the G. A. Gray Co., Cincinnati, in a paper on "A New System of Helical Involute Gearing for Use On Metal Planers." In this system the directions of rotation and the helical angles of the several gears are so chosen as to counterbalance and minimize end thrust, advantage being taken at the same time of the end thrust to counterbalance the side thrust of the cutting tools. The tooth form adopted is an involute having a $14\frac{1}{2}$ -deg. pressure angle, a pinion addendum of $\frac{3}{2}$ p in. and a pinion dedendum of $\frac{1}{2}$ p in., p being of normal diametral pitch. The advantages of this form of tooth for the work in question were enumerated at length and dimensions of a pinion, gear and rack designed according to the principles set forth are given in tabular form. Among those discussing the paper were Earle Buckingham, Pratt & Whitney Co., Hartford; Charles Meyer, Acme Machine Tool Co., Cincinnati, and F. K. Hendrickson, Reed-Prentice Co., Worcester.

Some of the more commonly used methods of testing and inspecting spur gears were briefly reviewed by M. Estabrook, Niles-Bement-Pond Co., New York. Two new devices for testing gears were described and illustrated by slides. These were the Saurer gear-testing machine, a Swiss development, and the Odontometer of the Pratt & Whitney Co., which is used for testing gears for tooth curves and spacing, and which can be used during the processes of manufacture.

"Spherical Gears" was the subject of a paper by Charles H. Logue, Syracuse, who pointed out that the basis for a study of all gears whose pitch surfaces are in rolling contact is found in the study of the bevel gear. "By acquiring this point of view," the speaker said, "not only are the elementary features of bevel-gear design brought out and applied to spur gears, but also the real connection between the two types is shown. This is essential to a complete understanding of either." Mr. Logue endeavored especially to point out the necessity for a difference in the design of the teeth heretofore not considered.

A paper on "Power Required for Cutting Metal," by Fred A. Parsons, Kemp Smith Milling Machine Co., Milwaukee, was read in part by Walter Ferris, vice-president, The Oilgear Co., Milwaukee. Various points were illustrated by slides. The paper gives the results of an investigation covering more than ten years, the purpose of which has been to determine the fundamental laws governing milling, turning, planing and drilling operations on various metals and alloys. In addition to many tests made on Kemp Smith milling machines, those reported by F. W. Taylor and Professors Bird and Fairfield in the society's transactions, have been analyzed and several variables studied. The author's results are given in the shape of formulas and tables by means of which the power required to machine metal in a given case may be calculated, and an example of their use worked out in detail. A description of a slide rule devised for making the calculations is given in the paper.

C. J. Oxford, National Twist Drill & Tool Co., Detroit, and R. Poliakoff, New York, were among those who discussed the paper.

Walter Ferris, The Oilgear Co., Milwaukee, presented a paper on "Applications of Hydraulic Transmission Variable-Speed Drive to Machine Tools and Manufacturing Processes." A number of applications

of the "Oilgear" to machine-tool and the driving of other machinery were described and illustrated. It was pointed out that hydraulic transmission has been in the course of development as a variable-speed drive for more than 25 years and applied to gun control, etc. The "Oilgear" was said to be based on the same principles as earlier hydraulic transmissions, but has been developed, since 1909, with a view to industrial requirements first. It was stated that this method opens a field in which great improvements in machine tool design may be made.

"A New Method of Determining the Effect of Speed Upon the Strength of Gear Teeth" was the subject of a paper by Wilfred Lewis, president Tabor Mfg. Co., Philadelphia, given at the research session.

Various methods of handling ash were described and illustrated in the paper by John Hunter and Alfred Cotton of the Heine Boiler Co., St. Louis, which was the only paper at the materials handling session. The paper began with the early developments on shipboard, but dealt for the greater part with stationary practice, beginning with rudimentary and progressing to the most modern installations, of which schematic and actual examples were given.

The session devoted to education and training for the industries consisted of reports on "Extension and Correspondence Schools," by J. A. Moyer, director, University Extension, Massachusetts Department of Education; and "Industrial Education as Represented in Schools," by C. R. Richards, staff, Federal Board for Vocational Education. A third report was that of R. L. Sackett, dean of engineering, Pennsylvania State College, on "Schools for Apprentices and Shop Training." These reports were intended to disclose the present status of industrial education and training in order to secure expert attention and advice to the end that the average efficiency of the process may be raised. W. W. Nichols, chairman of the committee, presided.

The steps taken in selecting the site for the location of a mill for rolling monel metal were given in detail by W. L. Wotherspoon, New York, in a paper on "Refinery and Rolling Mill for Monel Metal, Huntington, W. Va.," read at the general session. The economic problems involved were stated and the facts leading to their solution were given. The layout of the plant, with emphasis on features of design that were of particular interest, was described and illustrated by slides.

The size of dry-vacuum pump to employ in a given case, a rapid and practically accurate method for its determination, applying to any set of conditions, was outlined by E. W. Noyes and H. V. Sturtevant of the Sullivan Machinery Co., Claremont, N. H., at the general session.

Crane No. 1 Furnace Sold for Scrap

Crane No. 1 furnace, which was acquired by the Replogle Steel Co. in its purchase of the Empire Iron & Steel Co., has been sold by order of the board of directors to the H. Sofransky Co., dealer in iron and steel scrap, Allentown, Pa., and will probably be dismantled soon. It was built in 1839 and had been rebuilt several times.

This is the third furnace sold by the Replogle Steel Co. within two weeks, the sale of the Macungie and Topton furnaces having been reported in last week's issue of THE IRON AGE.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until Dec. 19, for material for the naval aircraft factory at Philadelphia, as follows: 11,250 pounds cold-rolled annealed nickel steel bars, schedule 330; 8600 chrome vanadium sheet steel, 96 in. long, schedule 331.

There has been an advance of \$1 a dozen in prices of shovels, the new quotations being \$8.41 a dozen for fourth grade black and \$9.41 for polished, f.o.b. makers' plant.

WILL BE REORGANIZED

Jones & Laughlin Steel Co. Becomes an Open Corporation with Increased Capital

PITTSBURGH, Dec. 5.—The Jones & Laughlin Steel Co. shortly will be reorganized and the name changed to the Jones & Laughlin Steel Corporation, while the capitalization now standing at \$30,000,000, all common stock, will be increased to \$120,000,000, of which \$60,000,000 will be 7 per cent cumulative preferred stock and \$60,000,000 of common stock. A limited amount of the preferred stock is to be offered the public and by this move the Jones & Laughlin company, which has been a closed corporation, becomes an open one.

Application for a charter under the laws of Pennsylvania for the new corporation has been made and all details for these changes have been completed and wait only formal action of the stockholders and directors at a meeting to be held this week. The management of the company will not be affected in any way by this transaction.

Prizes to Be Awarded Under Charles A. Coffin Foundation

The foundation committee of the Charles A. Coffin Foundation, established by the General Electric Co., as announced elsewhere in this issue, proposes to distribute the income of the foundation as follows:

1. Eleven thousand dollars in prizes for the most signal contributions by employees of the General Electric Co. toward the increase of its efficiency or progress in the electrical art. Particularly, the prizes are to further encourage suggestions from workmen. With each prize, the company will give a certificate of award. Foremen's prizes are to be awarded for the best department, taking into account its appearance, efficiency of operation, and conditions which add to the better conduct of the work and the welfare of the employees. All employees of the company, except executive officers, heads of departments, works managers, superintendents, district office managers and similar executives, are eligible for such prizes. In works where employees' representation has been adopted such representatives will co-operate with the prize committee in awarding prizes in such works.

2. A gold medal, to be known as the "Charles A. Coffin medal," will be awarded annually to the public utility operating company within the United States which, during the year, has made the greatest contribution toward increasing the advantages of the use of electric light and power for the convenience and well-being of the public and the benefit of the industry. The company receiving the medal will also receive \$1,000 for its employees' benefit or similar fund. A committee to be named by the National Electric Light Association and known as the Charles A. Coffin prize committee of the National Electric Light Association, which shall consist of its president, chairman of its public policy committee and a third member nominated by them, will award this medal, acting with the advice and co-operation of a committee appointed by the foundation committee. The expenses of the committee are to be paid out of the income of the foundation.

3. A gold medal, to be known as the "Charles A. Coffin Medal," will be awarded annually to the electric railroad company within the United States which, during the year, has made the greatest contribution toward increasing the advantages of electric transportation for the convenience and well-being of the public and the benefit of the industry. The company receiving the medal will also receive \$1,000 for its employees' benefit or similar fund.

4. Five thousand dollars is to be awarded annually for fellowships to graduates of American colleges and technical schools, who, by the character of their work, and on the recommendation of the faculty of the in-

stitution where they studied, could with advantage continue their research work either here or abroad; or some portion or all of the fund may be used to further the research work, at any of the colleges or technical schools in the United States. The fields in which these fellowships and funds for research works are to be awarded are: electricity, physics and physical chemistry. A committee appointed by the foundation committee will award such fellowships and funds for research work, with the advice and co-operation of a committee of three, one to be appointed by each of the following: National Academy of Sciences, American Institute of Electrical Engineers and Society for the Promotion of Engineering Education.

5. In each annual report of the General Electric Co. a statement will be made of the awards under the "Charles A. Coffin Foundation," and other publicity will be given to such awards.

The board of directors of the General Electric Co. has appointed as the Charles A. Coffin Foundation Committee the following officers of the company: A. W. Burchard, J. R. Lovejoy, E. W. Rice, Jr., Gerard Swope, O. D. Young.

Relieving Industry of Burden

In a paper on this subject before the management division of the American Society of Mechanical Engineers, Dec. 5, at the annual meeting in New York, Wallace Clark, industrial engineer, New York, stressed the importance of (1) getting into active use all the equipment possible, and (2) disposing of equipment which can not be kept busy. He referred particularly to the heavy burden of idleness and waste now carried by manufacturing plants because their capacity exceeds present demands. The paper presents a general plan for lifting this burden, largely through reducing the time of manufacture.

W. N. Polakov, consulting engineer, New York, brought out, in the discussion, that nearly all waste in industry may be traced to waste in men's time. He divided the history of scientific management into three periods: 1880 to 1905, dogmatic period, in which the observer was everything and the observed scarcely considered; 1905 to 1915, analytic period, in which, under the leadership of H. L. Gantt, was begun a scientific analysis of interrelated phenomena; 1915 to date, relativist period, devoted to charting methods, in which industry, management and the manager, and their activities, have been regarded as joint phenomena.

Frank B. Gilbreth, Montclair, N. J., divided idleness into three parts: Rest, for overcoming fatigue; delay, through unavoidable causes; avoidable delay. The economics of idleness is the first step, he maintains, in the study of economics for the worker, and the study of idleness is as definite a thing as any time study or study of fatigue.

Fred J. Miller, New York, pointed out that previous attempts at attacking this problem have centered on improving the worker, not the management, whereas management carries by far the larger share of responsibility for existing waste in industry. Scheduling work to avoid this waste does not necessarily mean that the workman has to work any faster or any more steadily, but it aims to obviate the delays due to lost motion and misdirected effort.

John Younger, vice-president Standard Parts Co., Cleveland, cited the situation near the end of the war, when thousands of trucks were being built for military purposes, to the exclusion of pleasure cars. One of his plants was furnishing springs for the trucks, but shortage of steel for this purpose made a shortage in springs. Seeing this shortage of springs for trucks—the heaviest kind—small plants devoted to the manufacture of this very product sprang up all over the country. Could their managers have visualized the real situation, through the operations of a trade association, they would have seen that the shortage of springs was not due to a shortage in manufacturing facilities, and hence would not have added equipment which soon became idle.

NEW WICKWIRE-SPENCER FACTOR

J. Leonard Replogle Acquires an Interest in the Wire Company

J. Leonard Replogle, chairman of the board of the Replogle Steel Co. and president of the Vanadium Corporation of America, has been elected a director of the Wickwire-Spencer Steel Corporation, of Worcester, Mass., and Buffalo. In making the announcement, President T. H. Wickwire, Jr., stated that Mr. Replogle has acquired a substantial interest in the Wickwire-Spencer company and will take an active part in the management. This new connection with the wire business is a step in carrying out Mr. Replogle's plans for re-entering the finished steel industry. The published reports of his acquisition of a Wickwire-Spencer interest have referred to the possibility of a further move in which the Replogle Steel Co. would be concerned, but there has been no definite development.

The Wickwire-Spencer Steel Corporation was formed early in 1920 by the consolidation of the Clinton-Wright Wire Co., Worcester, and the Wickwire Steel Co., Buffalo. Previously there had been a consolidation taking in the plants of the Wright Wire Co., the Morgan Spring Co., the Clinton Wire Cloth Co. and the Spencer Wire Co. The capitalization of the Wickwire-Spencer Steel Corporation includes \$7,500,000 8 per cent convertible preferred stock and \$12,500,000 7 per cent mortgage bonds, together with 330,000 shares of common stock.

The Wickwire-Spencer plant at Buffalo consists of two blast furnaces with an annual capacity of 300,000 tons, a steel plant equipped with four 60-ton open-hearth furnaces and a wire mill having 600 wire drawing blocks, 80 wire nail machines, 50 tack machines, 24 barbed wire machines and 4 galvanizing pans. The

steel plant has a capacity of 170,000 tons of ingots per year, converted into 120,000 tons of wire rods and 30,000 tons of small billets. In raw materials the company has an interest in the Hanna Ore Mining Co., Mesabi range, and the Buffalo Iron Mining Co., giving it 250,000 tons of iron ore a year, and from the Wickwire Mining Co.'s property 200,000 tons a year. The Wickwire Limestone Co. has a quarry at Gasport, N. Y.

The Replogle Steel Co.'s iron ore and blast furnace operations in the Wharton, N. J., district have been extended in an important way in the past three years. Two modern blast furnaces have been built at Wharton, an extensive sintering plant and well-equipped ore yards and bin system. The principal iron mines of the company are the Replogle and the Hibernia.

Early in 1922 the Replogle Steel Co. acquired the Empire Steel & Iron Co., with blast furnaces at Catsauqua, Macungie and Topton, Pa., and at Oxford, N. J.—five in all. The Topton and Macungie furnaces have been sold recently, and the policy of the Replogle Steel Co. indicates a concentration of pig iron production at the Wharton plant, where there is ample space for the addition of two more modern furnaces. The second Wharton furnace is ready for operation and will be started when conditions in the pig iron market warrant it. For the one furnace now running, a few more than 100 men are required. The second furnace could be operated with an increase of the force to a total of 125 men.

Recently the working of the Elizabeth vein at the Mt. Hope iron mine, which was acquired with the Empire Steel & Iron Co., has given the company an ore of increased iron content. This ore is now being taken out from the 900-ft. level, and much of it is running 60.80 in metallic iron. In the operation of the Wharton furnaces, as high as 100 per cent of New Jersey magnetite has been used.

ORE RATE CASE LOST

Examiner for Interstate Commerce Commission Decides Against Buffalo Interests

WASHINGTON, Dec. 5.—Passing upon the complaint of the Lackawanna Steel Co. and other producers in the Buffalo district, Examiner Bronson Jewell to-day handed down a tentative report recommending that the Interstate Commerce Commission find that rates charged for transportation of coal and coke from the Reynoldsville, Pittsburgh and Connellsville districts to Buffalo are not unjust or unreasonable or unduly prejudicial in comparison with rates charged interior iron and steel interests for the transportation of iron ore from Lake Erie ports. The examiner recommends that the complaint be dismissed.

The proceeding, one of the most important rate cases involving the iron and steel industry, is an outgrowth of attempts by the railroads to reduce rates on iron ore prior to the decision of July 1, 1922, when a general reduction of 10 per cent was made in railroad rates by the Commission. It was the attitude of the complainants that the relationship of the rates on fuel northbound and iron ore southbound was reasonably satisfactory previous to the general rate increase of 40 per cent in 1920.

On account of the difference in the amounts and the manner in which the increases were applied, the complainants contended that the relationship of the rates was destroyed to their disadvantage. It was proposed by the complainants that the rate of \$2.51 to Buffalo be reduced to \$2.38 and that the ore rate to interior furnaces be increased 30.8c. per ton. This sum represented the amount increased 40 per cent asked by the ex-lake ore carriers as their share of the 40 per cent increase which applied entirely to the carriers in the Upper Lake region.

The examiner said that some of the disadvantage Buffalo claimed had been removed by the reduction that went into effect July 1, in which case the Commission

reached the conclusion that uniform reduction should be made and not different kinds of reductions as proposed by the Lake iron interests.

"In answer to complainants' charge that the carriers have for many years wilfully conspired systematically to rob iron and steel plants at Buffalo," said the examiner, "it is sufficient to point out that witnesses for these interests stated that the relationship of ore and fuel rates was satisfactory up to June 25, 1918. Since that time the only changes which have occurred have been caused either by order of the Director General or pursuant to decision of this Commission."

Minnesota Occupation Tax Argument in Supreme Court

WASHINGTON, Dec. 5.—Arguments will be made in the United States Supreme Court probably to-morrow or Thursday on the Minnesota Occupation Tax. This relates to a tax of six per cent assessed by the State of Minnesota on the value of iron ore at the place where it is mined less deductions for the expense of mining and certain other deductions. The tax has been upheld by the Supreme Court of Minnesota and the decision has come before the United States Supreme Court on appeal of the Oliver Mining Co. and prominent steel interests owning and mining ore in Minnesota.

The tax is being attacked first because it is alleged that it constitutes a burden on interstate commerce for the reason that all the ore, with a negligible exception, is mined pursuant to contracts previously made which provide for the mining, selling and delivery of the ore at lower lake ports. Secondly, it is claimed that irrespective of the question of interstate commerce, the tax is void under the constitutions of the United States and Minnesota, because it is unequal in its operation.

From a legal standpoint the case has assumed added interest as the result of the recent decision of the United States Supreme Court upholding the tax assessed by the State of Pennsylvania on the production of anthracite coal.

NOVEMBER IRON OUTPUT

Gain Last Month 9898 Tons Per Day as Compared with October

Twenty-six Furnaces Blown In and Only Two Blown Out or Banked

Another record in the country's pig iron output in the last two years was registered in November. It is necessary to go back to November, 1920, to find a month which exceeds the record made by the blast furnaces of the country last month. While the increase over October was not so large as the increase in October over September, it was remarkably heavy, when the shorter month is considered. Not only was the total production last month the largest since November, 1920, but the number of furnaces active on Dec. 1 was the greatest since Dec. 1, 1920. There were 26 furnaces blown in during November and only two blown out, or a net gain of 24, which compares with a net gain of 29 in October. The increase also in daily output of 9898 tons over October was nearly 12 per cent.

Production of coke and anthracite pig iron for the 30 days in November amounted to 2,849,703 gross tons, or 94,990 tons per day, as compared with 2,637,844 tons, or 85,092 tons per day in October, a 31-day month. This represents a gain of 211,859 tons over October. In November, 1920, the total output was 2,934,908 tons, or 97,830 tons per day.

The total number of furnaces in blast on Dec. 1 was 242 as compared with 218 on Nov. 1, with 144 on Sept. 1, with 172 on Aug. 1, and with only 29 on Aug. 1, 1921, the low point in that year's depression. On Dec. 1, 1920, the number of furnaces in blast was 252. The capacity of the 242 furnaces in blast on Dec. 1 is estimated at 97,135 tons per day, as compared with 87,935 tons per day for the 218 furnaces in blast on Nov. 1. This is an increase of 9200 tons per day.

The manganese-iron alloy output for November was 17,424 tons, of which 13,232 was ferromanganese and 4192 was spiegeleisen.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from November, 1921, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
November, 1921	37,960	9,223	47,183
December	41,173	12,023	53,196
January, 1922	42,130	10,933	53,063
February	46,827	11,387	58,214
March	53,547	12,128	65,675
April	56,930	12,140	69,070
May	60,619	13,790	74,409
June	62,534	16,167	78,701
July	62,295	15,297	77,592
August	45,672	12,914	58,586
September	53,856	13,935	67,791
October	66,060	19,032	85,092
November	72,177	22,813	94,990

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for November and the three months preceding:

Pig Iron Production by Districts, Gross Tons				
	Nov. (30 days)	Oct. (31 days)	Sept. (30 days)	August (31 days)
New York	164,987	148,419	115,635	80,322
New Jersey	12,071	13,134	10,736	11,604
Lehigh Valley	64,889	63,635	55,711	46,254
Schuylkill Valley	71,861	66,232	41,646	35,286
Lower Susquehanna and Lebanon Val- leys	36,004	32,374	25,440	20,679
Pittsburgh district	639,462	610,281	502,804	432,178
Shenango Valley	110,028	92,728	63,841	58,812
Western Penna.	127,682	116,508	68,140	62,659
Maryland, Virginia and Kentucky	70,030	54,856	44,136	41,324
Wheeling district	77,764	72,770	43,366	57,752
Mahoning Valley	321,188	302,434	218,363	130,555
Central and North- ern Ohio	309,680	290,185	184,914	191,880
Southern Ohio	41,868	28,248	17,909	15,305
Illinois and Indiana	458,956	416,073	346,380	342,363
Mich., Minn., Mo., Wis. and Colo.	112,952	98,608	67,656	67,265
Alabama	209,006	210,994	204,802	204,389
Tennessee	21,275	20,365	22,241	17,543
Total	2,849,703	2,637,844	2,033,720	1,816,170

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons			
	Total Production		
	1920	1921	1922
Jan.	2,232,455	1,932,159	1,306,045
Feb.	2,181,679	1,625,695	1,311,170
Mar.	2,480,668	1,323,443	1,629,982
Apr.	1,968,542	1,015,621	1,707,902
May	2,128,720	1,024,678	1,879,180
June	2,209,770	883,312	1,876,033
July	2,230,567	715,664	1,931,138
Aug.	2,254,943	807,144	1,415,832
Sept.	2,247,250	815,692	1,615,696
Oct.	2,393,644	1,034,312	2,047,873
Nov.	2,150,075	1,138,789	2,165,295
Dec.	2,047,167	1,276,381	.....
			Spiegeleisen and Ferromanganese
			1920 1921 1922
Jan.	23,957	22,228	6,874
Feb.	28,038	29,013	8,540
Mar.	35,275	41,294	13,695
Apr.	27,628	24,310	13,209
May	33,407	9,232	20,334
June	34,751	4,536	23,090
July	36,789	5,524	26,049
Aug.	36,985	3,878	19,327
Sept.	39,546	3,289	14,916
Oct.	34,786	3,902	21,478
Nov.	26,944	3,525	17,424
Dec.	28,023	3,953	.....

Capacities in Blast Dec. 1

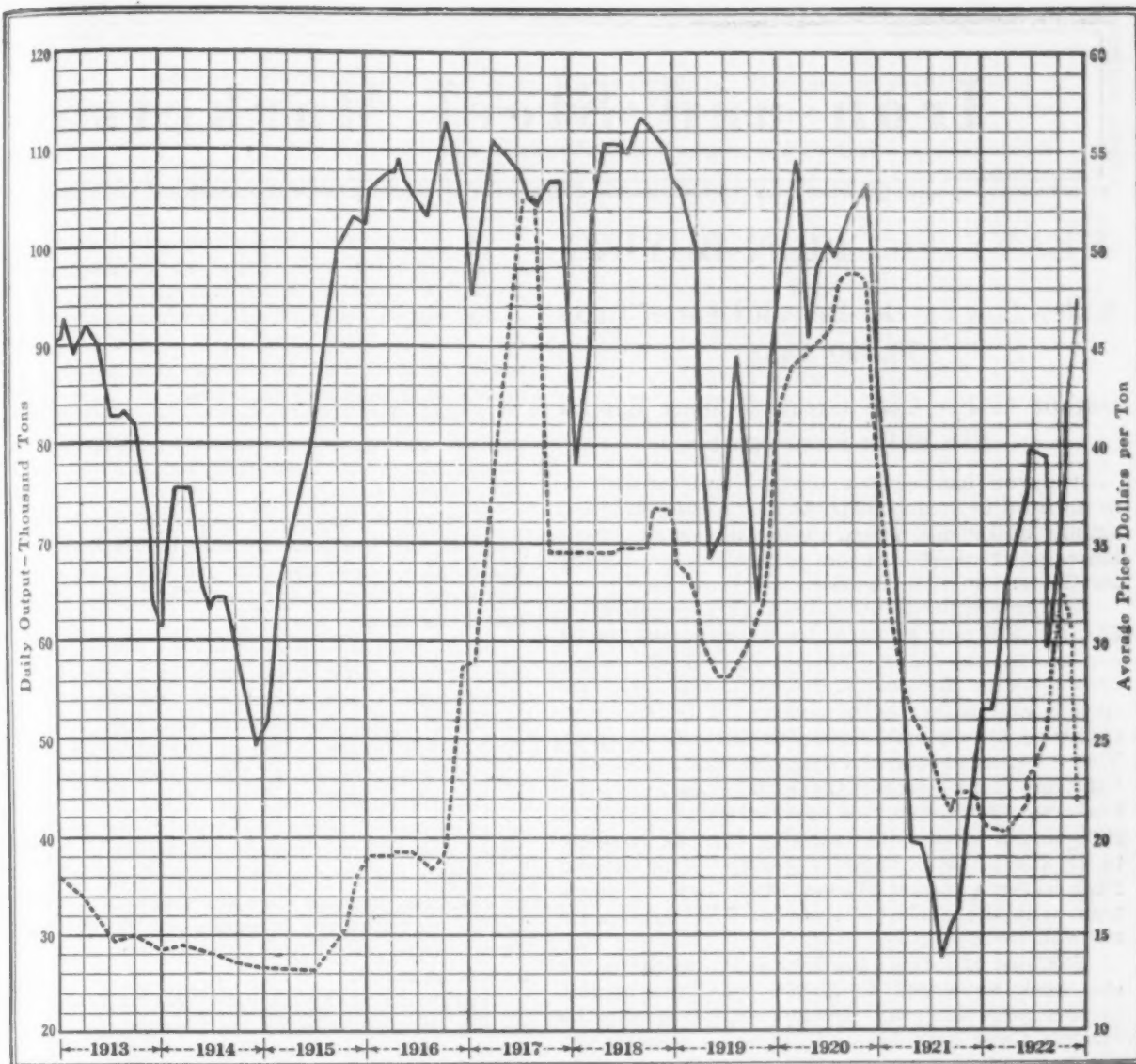
The following table shows the number of furnaces in blast Dec. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Nov. 1:

Coke and Anthracite Furnaces in Blast					
Location of Furnaces	Total Stacks	Dec. 1 In Blast	Dec. 1 Capacity per Day	Nov. 1 In Blast	Nov. 1 Capacity per Day
New York:					
Buffalo	22	13	5,495	12	4,800
Other New York	4	1	70	0	.....
New Jersey	4	1	405	1	420
Pennsylvania:					
Lehigh Valley	18	5	2,020	5	1,900
Spiegel	2	1	140	1	150
Schuylkill Valley	15	8	2,600	6	2,130
Lower Susquehanna	10	3	1,095	3	1,096
Lebanon Valley	6	1	145	1	130
Ferromanganese	2	1	70	0	.....
Pittsburgh District	55	45	21,300	42	19,500
Ferromanganese and Spiegel	4	2	285	2	390
Shenango Valley	19	10	3,750	9	3,500
Western Penna.	26	12	4,555	10	4,050
Maryland	5	4	1,530	4	1,530
Ferromanganese	1	1	110	1	75
Wheeling District	15	6	2,840	5	2,430
Ohio:					
Mahoning Valley	28	22	10,930	21	9,830
Central and Northern	26	22	10,300	22	9,360
Southern	16	8	1,730	4	930
Illinois and Indiana	42	30	15,400	28	14,340
Mich., Wis. and Minn.	12	10	3,450	9	3,085
Colorado and Missouri	6	1	420	1	430
The South:					
Virginia	16	4	560	1	365
Kentucky	7	1	260	1	260
Alabama	40	23	6,965	21	6,500
Ferromanganese	1	0	.....	1	70
Tenn., Ga. and Texas	16	7	710	7	670
Total	418	242	97,135	218	87,935

The figures for daily average production, beginning with January, 1916, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1916—Gross Tons							
	1916	1917	1918	1919	1920	1921	1922
Jan.	102,746	101,643	77,799	106,525	97,264	77,945	53,063
Feb.	106,456	94,473	82,835	105,006	102,720	69,187	58,214
Mar.	107,667	104,882	103,648	99,685	108,900	51,468	65,675
Apr.	107,592	111,165	109,607	82,607	91,327	39,768	69,070
May	108,422	110,238	111,175	68,002	96,312	39,394	74,409
June	107,053	109,002	110,793	70,495	101,451	35,494	78,701
July	104,017	107,820	110,354	78,340	98,931	27,889	77,592
Aug.	103,346	104,772	109,341	88,496	101,529	30,780	58,586
Sept.	106,745	104,465	113,942	82,932	104,310	32,850	67,791
Oct.	113,189	106,550	112,482	60,115	106,212	40,215	85,092
Nov.	110,394	106,859	111,802	79,745	97,830	47,183	94,990
Dec.	102,537	92,997	110,762	84,944	87,222	53,196	.....

Among the furnaces blown in during November were the following: One Susquehanna furnace in the Buffalo district and the Standish furnace in New York; two Warwick furnaces in the Schuylkill Valley; the Robeson furnace in the Lebanon Valley; the Neville Island furnace of the Carnegie Steel Co., No. 2 Eliza furnace of the Jones & Laughlin Steel Co. and the Clinton furnace in the Pittsburgh district; Claire fur-



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

nace in the Shenango Valley; the Scottdale furnace and No. 1 Johnstown furnace of the Cambria Steel Co. in western Pennsylvania; the Buena Vista furnace of the Allegheny Ore & Iron Co., one Low Moor furnace and the Pulaski furnace in Virginia; Riverside No. 2 furnace of the National Tube Co. in the Wheeling district; No. 1 Ohio furnace of the Carnegie Steel Co. in the Mahoning Valley; the Globe, Hamilton and Sarah furnaces and the Marting furnace of the Marting Iron & Steel Co. in southern Ohio; two South Chicago furnaces of the Illinois Steel Co. and No. 6 Gary furnace in the Chicago district; one Bay View furnace in Wisconsin; No. 3 North Birmingham furnace of the Sloss-Sheffield Steel Co. and No. 5 Ensley furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Only two furnaces were blown out during November: No. 1 Joliet furnace of the Illinois Steel Co. in the Chicago district and No. 1 Woodward furnace of the Woodward Iron Co. in Alabama, the latter for relining.

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2

foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1918—Gross Tons

	1918	1919	1920	1921	1922
Jan. ...	2,411,768	3,302,260	3,015,181	2,416,292	1,644,951
Feb. ...	2,319,299	2,940,168	2,978,879	1,937,257	1,629,991
Mar. ...	3,213,091	3,090,243	3,375,907	1,595,522	2,035,920
Apr. ...	3,288,211	2,478,218	2,739,797	1,193,041	2,072,114
May ...	3,446,412	2,108,056	2,985,682	1,221,221	2,306,679
June ...	3,323,791	2,114,863	3,043,540	1,064,833	2,361,028
½ year.	18,002,572	16,033,808	18,138,986	9,428,166	12,050,683
July ...	3,420,988	2,428,541	3,067,043	864,555	2,405,365
Aug. ...	3,389,585	2,743,388	3,147,402	954,193	1,816,170
Sept. ...	3,418,270	2,487,965	3,129,323	985,529	2,033,720
Oct. ...	3,486,941	1,863,553	3,292,597	1,246,676	2,637,844
Nov. ...	3,354,074	2,392,350	2,934,908	1,415,481	2,849,703
11 mos.	35,072,430	27,949,610	33,710,259	14,894,911	23,793,485
Dec. ...	3,433,617	2,633,268	2,703,855	1,649,086	.....
Ttl. yr.*	38,506,047	30,582,878	36,414,114	16,542,686	.....

*These totals do not include charcoal pig iron. The 1921 production of this iron was 94,730 tons.

Iron and Steel Markets

HEAVY PIG IRON BUYING

A New Low Level—Detroit District Takes 50,000 Tons

Output 11 Per Cent Greater—Sheet Bars at \$36.50 for First Quarter

The week has been marked by a burst of activity in pig iron in several districts apart from the East, notably at Detroit, prices giving way to an extent indicating that both buyers and sellers are feeling for the bottom of the market.

In the South, a round tonnage was placed at \$21, but \$23 now prevails, as it did before the \$2 concession was made. The naming of \$26 as the base price in the Detroit district found quick response and sales there aggregated 50,000 tons, chiefly to automobile, stove and furnace interests. There was also liberal buying at Buffalo at \$25, but price concessions at Cleveland developed little business. A fair volume of orders was placed at Pittsburgh, the declines ranging from \$2 on basic to \$1 and \$1.50 on foundry grades. The eastern Pennsylvania market showed little change, in contrast with the weakness elsewhere, but sales were not numerous.

Arrivals of foreign pig iron at Philadelphia for the week amounted to 20,900 tons, the largest for any week this year. In the past two months the receipts there have been 94,000 tons. Concessions are being made on import iron in the effort to keep up the movement. Eastern pig-iron makers meanwhile plan to go to the President for a 50 per cent increase in the 75-cent duty.

November pig iron output was the largest since November, 1920. At 2,849,703 tons in 30 days, it averaged 94,990 tons a day, against 2,637,844 tons in October, or 85,092 tons a day. The increase was over 11 per cent. The merchant furnaces made the surprising gain of 3800 tons a day over their October rate and are now producing 10,000 tons a day more than in August, an increase of about 75 per cent in the three months.

The net gain in active furnaces last month was 24. The total on Dec. 1 was 242, with a daily capacity of 97,135 tons against 87,935 tons a day for 218 furnaces on Nov. 1.

Pig iron production is now at a yearly rate of 35,500,000 tons. In all last year 16,688,000 tons, or less than half as much, was made. The high record was 39,434,000 tons in 1916.

In the steel market the chief new feature was the naming of \$36.50 by the Carnegie Steel Co. as its sheet bar price for the first quarter of 1923. The figure is midway between the \$35 for which buyers have been maneuvering and the \$38 price for which some sellers have been holding. While no formal announcement has been made of a billet price it is expected to be the same as for sheet bars.

It now appears that the Steel Corporation's total purchases of semi-finished steel some weeks ago were no less than 150,000 tons, of which 100,000 tons was for the National Tube Co. and 50,000 tons for the American Sheet & Tin Plate Co.

In finished steel the first week of December continues the large-scale output of the second half of November and the minor variations in prices of plates, shapes and bars. Buyers stress the fact that deliveries by some mills have improved to such an extent that certain consumers are getting deliveries sooner than they expected.

A few plate mills appear to need orders for immediate rolling, and in one case a 3000-ton inquiry for plates for a Lake shipyard brought out one bid of 1.80c. at mill.

Automobile plants are operating at a higher rate than in any previous December. Makers are not hastening to buy steel for the first quarter, their inquiries, which point to liberal buying, being mostly tentative.

The range of 1.90c. to 2c. on heavier products continues on prompt business as in recent weeks. At Chicago in particular the obligations of the mills are heavy. Rail bookings in that district are well over 800,000 tons. The cars placed there in the past two weeks represent 100,000 tons of rolled steel.

Awards of 4200 more cars bring the total so far this year to over 145,000 freight cars. With 25,000 under negotiation (over 10,000 added in the week) the year's car buying will be close to the 170,000 of 1916 and greater than for any other year since 1912. Locomotive business is notably active. Orders were placed for 139, with new inquiries for almost as many.

Large orders for machine tools have been placed during the past week by the Chicago, Burlington & Quincy and the Pennsylvania Lines East. The Burlington orders foot up to \$500,000 and those of the Pennsylvania to about half as much. The Missouri Pacific has an inquiry out for 53 machines.

The Philadelphia-Camden bridge towers account for half of the 20,000 tons of fabricated steel contracted for in the week, and building work in New York and Chicago furnished much of the 22,000 tons of fresh inquiries.

The United States Cast Iron Pipe & Foundry Co. was low bidder on 20,000 tons of cast iron water pipe for San Juan, Porto Rico. South America is inquiring for 50,000 boxes of tin plate.

Pittsburgh

Steel Corporation Announces Sheet Bar Price—Pig Iron Prices Decline

PITTSBURGH, Dec. 5.—Sharp recessions in pig iron prices, which, however, have been accompanied by a fair amount of activity, are the outstanding feature of the past week in this market. Basic grade has had a clear decline of \$2 a ton since a week ago, while Valley Bessemer iron is offered at \$1 a ton and foundry grades \$1.50 a ton lower. On the latter grade, there has been business for first quarter of 1923 delivery as low as \$25, Valley Furnace, or \$2 a ton below the price of a week ago, but as yet that price has not been done on tonnages for early shipment.

Fresh weakness also has developed in the coke market, which is at least 50c. a ton lower than a week ago, and while this may be partly ascribed to pressure on the part of pig iron producers, the principal reason

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 5, 1922	Nov. 28, 1922	Nov. 7, 1922	Dec. 6, 1921
No. 2X, Philadelphia...	\$29.14	\$29.14	\$31.14	\$22.34
No. 2, Valley furnace...	25.50	27.00	29.00	20.50
No. 2, Southern, Cin'ti...	27.05	27.05	29.05	22.00
No. 2, Birmingham, Ala...	23.00	23.00	25.00	17.50
No. 2 foundry, Chicago...	23.00	23.00	30.00	20.00
Basic, del'd, eastern Pa...	27.50	27.50	28.14	21.00
Basic, Valley furnace...	25.00	26.50	29.00	19.00
Valley Bessemer, del. P'gh	31.77	32.77	34.27	21.96
Malleable, Chicago...	28.00	29.00	30.00	20.00
Malleable, Valley	27.00	28.00	30.00	20.00
Gray forge, Pittsburgh...	26.77	28.27	30.77	21.46
L. S. charcoal, Chicago...	36.15	36.15	36.15	31.50
Ferromanganese, furnace...	100.00	100.00	100.00	60.00

Rails, Billets, etc., Per Gross Ton:

O-h. rails, heavy, at mill...	\$43.00	\$43.00	\$43.00	\$40.00
Bess. billets, Pittsburgh...	36.50	37.00	38.00	29.00
O-h. billets, Pittsburgh...	36.50	37.00	38.00	29.00
O-h. sheet bars, P'gh...	36.50	37.00	38.00	30.00
Forging billets, base, P'gh	45.00	45.00	45.00	32.00
O-h. billets, Phila.	43.17	43.17	45.17	34.74
Wire rods, Pittsburgh...	45.00	45.00	45.00	38.00
Skelp, gr. steel, P'gh, lb...	2.00	2.00	2.00	1.50
Light rails at mill	2.15	2.00	2.00	1.55

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.275	2.275	2.325	1.95
Iron bars, Chicago	2.35	2.50	2.50	1.65
Steel bars, Pittsburgh...	2.00	2.00	2.00	1.50
Steel bars, Chicago	2.10	2.10	2.10	1.60
Steel bars, New York	2.34	2.34	2.34	1.80
Tank plates, Pittsburgh...	1.95	1.95	2.00	1.50
Tank plates, Chicago	2.30	2.30	2.30	1.60
Tank plates, New York	2.29	2.34	2.34	1.85
Beams, Pittsburgh	2.00	2.00	2.00	1.50
Beams, Chicago	2.20	2.20	2.20	1.65
Beams, New York	2.34	2.34	2.34	1.85
Steel hoops, Pittsburgh...	2.75	2.75	2.90	2.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Dec. 5, 1922	Nov. 28, 1922	Nov. 7, 1922	Dec. 6, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.35	3.35	3.35	3.00
Sheets, galv., No. 28, P'gh	4.35	4.35	4.50	4.00
Sheets, blue an'd, 9 & 10	2.50	2.50	2.60	2.25
Wire nails, Pittsburgh...	2.70	2.70	2.70	2.75
Plain wire, Pittsburgh...	2.45	2.45	2.45	2.50
Barbed wire, galv., P'gh...	3.35	3.35	3.35	3.40
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$4.75

Old Material, Per Gross Ton:

Carwheels, Chicago	\$24.00	\$24.00	\$25.00	\$16.00
Carwheels, Philadelphia ..	20.00	20.00	21.00	17.00
Heavy steel scrap, P'gh...	20.50	20.50	20.50	14.00
Heavy steel scrap, Phila...	16.00	16.00	16.50	11.50
Heavy steel scrap, Ch'go...	17.00	17.00	17.75	11.50
No. 1 cast, Pittsburgh...	22.00	22.50	23.50	16.50
No. 1 cast, Philadelphia...	20.00	20.00	22.00	17.50
No. 1 cast, Ch'go (net ton)	19.50	19.50	20.50	13.00
No. 1 RR. wrot, Phila....	19.00	19.00	19.00	15.50
No. 1 RR. wrot, Ch'go (net)	15.00	15.25	16.50	10.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt....	\$6.50	\$7.00	\$7.50	\$2.75
Foundry coke, prompt....	7.50	8.00	9.00	4.00

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.12½	14.12½	14.12½	13.75
Electrolytic copper, refinery	13.75	13.62½	13.62½	13.50
Zinc, St. Louis	7.10	7.02½	7.10	4.37½
Zinc, New York	7.45	7.37½	7.45	5.37½
Lead, St. Louis	6.95	6.95	6.85	4.45
Lead, New York	7.30	7.30	7.15	4.70
Tin (Straits), New York...	36.25	36.37½	38.00	31.75
Antimony (Asiatic), N. Y.	6.40	6.50	6.60	4.50

Composite Price, Dec. 5, 1922, Finished Steel, 2.439c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Nov. 28, 1922, 2.439c. Nov. 6, 1922, 2.446c. Dec. 6, 1921, 2.135c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, Dec. 5, 1922, Pig Iron, \$25.86 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Nov. 28, 1922, \$26.77 Nov. 6, 1922, 25.86 Dec. 6, 1921, 19.47 10-year pre-war average, 15.72
---	--

is found in the fact that production lately has been running so much ahead of consumption that some of the Connellsville operators, instead of maintaining the recent effort to increase production, have begun to curtail.

The principal feature in the situation has been the announcement by the Steel Corporation of the price of \$36.50 on sheet bars for first quarter of 1923 shipment. This announcement probably points the way for independent producers who lately have been quoting \$37 to \$38, while buyers have been trying to place tonnages at \$35. If the market can be maintained at \$36.50 for sheet bars, the effect probably will be to prevent serious price cutting in sheets and tin plate.

In finished lines, conditions are much as they were a week ago. Mills with light order books are giving ear to lower bids on attractive tonnages, but those having large bookings find no abatement in the demands of those who have placed the orders, and cancellations are so infrequent as to be a matter of comment. There is no special reason for making any material price changes. We note no important falling away in plant operations in this and nearby districts except for the suspension of two blast furnaces. The Shenango Furnace Co. last night blew out its No. 4 stack because of necessity for repairs, while the Tod furnace of the Brier Hill Steel Co., Youngstown, is scheduled to go out of blast this week.

Pig Iron.—This market has been clearly established on basic grades in the past week at \$25 at Valley furnace by one sale to a Pittsburgh district sheet maker at that figure and another of 4000 tons to a West Virginia steel maker at a price which is not divulged, but is not believed to have been more than \$25, Valley furnace. Sales have been done during the week as high as \$26.50 for 750 tons of special analysis basic and we also note the sale of 1000 tons of standard basic at \$26. There is an inquiry before the market amounting to 15,000 tons a month over the first quarter of the new year, from a central Ohio steel maker who recently made some big purchases. Valley Bessemer iron is quoted at \$30, furnace, this price being supported by a sale of 300 tons, but it is a question how long this grade can hold at that price, since it measures a premium of \$5 a ton over basic, and there is no claim that there is any such difference in the producing costs of the two kinds. Moreover, Bessemer iron has been offered and sold at \$29, Johnstown, the freight rate into Pittsburgh being the same as from the Valley or \$1.77 per ton. The most acute weakness has been in foundry iron, sales of which for early delivery have been made anywhere from \$26.50 down to \$25.50, Valley furnace, for No. 2, while we note one sale of 2000 tons for first quarter delivery at \$25 flat, and there is an unconfirmed report that 5000 tons, also for first quarter delivery, has been closed at the same figure. An absence of

sales makes it impossible to give more than an appraisal of the market on malleable and gray forge grades. A few carloads of low phosphorus iron have been sold at \$37, Valley furnace. W. P. Snyder & Co. make the November average price of Bessemer iron from Valley furnaces \$31.75 and of basic \$27.60, as compared with \$33.50 and \$30 respectively in October.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.77 per gross ton:

Basic	\$25.00 to \$26.00
Bessemer	30.00
Gray forge	25.00 to 25.50
No. 2 foundry	25.00 to 26.00
No. 3 foundry	25.00 to 25.50
Malleable	27.00
Low phosphorus, copper free	37.00

Ferroalloys.—Sales of ferromanganese again are rather light in this district, but the market appears firm at \$100 per gross ton, Atlantic seaboard, for either domestic or British 80 per cent material, freight to Pittsburgh common rate points, being \$4.79. Not much business yet has been done here in 50 per cent ferrosilicon which now is quoted at \$82.50 to \$85 per gross ton delivered. Consumers of this material are pretty well covered to the end of the year and are rather slow to enter negotiations for their 1923 requirements. Spiegeleisen is dull and easy; the leading commercial maker is quoting 20 per cent material at \$37, furnace, and 16 to 19 per cent at \$36, but it is believed that attractive orders would bring lower prices. Effective Nov. 30, Jackson, Ohio, makers of Bessemer ferrosilicon and deliveries made a further reduction in prices of \$2 per ton. The new quotations on Bessemer ferrosilicon now are much more nearly in line with the prices quoted on the product of electric furnaces which is priced at \$42 for 10 per cent; \$43 for 11 per cent; and \$44 for 12 per cent f.o.b. Niagara Falls, with freight to Pittsburgh of \$3.56.

We quote 80 per cent ferromanganese at \$100, furnace, or \$104.79 delivered Pittsburgh district for either domestic or British, and 76 to 80 per cent German at \$67 c.i.f. Atlantic seaboard. Average 20 per cent spiegeleisen, \$37, furnace; 16 to 19 per cent, \$36 or domestic; 20 per cent foreign, \$37 f.o.b. Atlantic seaboard, duty paid; 50 per cent ferrosilicon, domestic, \$82.50 to \$85, delivered. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$44.50; 11 per cent, \$47.80; 12 per cent, \$51.10; 13 per cent, \$55.10; 14 per cent, \$60.10; silvery iron, 6 per cent, \$33; 7 per cent, \$34; 8 per cent, \$35.50; 9 per cent, \$37.50; 10 per cent, \$39.50; 11 per cent, \$42; 12 per cent, \$44.50; 13 per cent, \$47. The present freight rate from Jackson and New Straitsville into the Pittsburgh district is \$3.66 per gross ton.

Steel Skelp.—Mills here are quoting steel pipe skelp at 2c. for either grooved or sheared and report a fair demand at that price.

Wire Products.—Mills in this district still have all the business they can readily handle and since they are making strong effort toward cleaning up old obligations, new business, especially that calling for early delivery, is not easily placed. Labor and transportation conditions are somewhat better than they were recently, but the leading interest is said to be sold over the greater part of the first quarter of 1923, and four to six weeks is the best promise independents will make on delivery of nails where the demand is heaviest. Prices are very firm on all products with no extensions being given on unspecified contracts made at the September prices. Prices are given on page 1537.

Iron and Steel Pipe.—Although improved conditions in regard to labor and car supplies have permitted a freer movement and some reduction in mill stocks, the demand remains heavy, particularly in standard pipe, and delivery promises still are pretty extended. On butt weld sizes of standard pipe, eight weeks is as early as deliveries are promised on new orders. The National Tube Co. has blown in the larger of its two blast furnaces at its Riverside works, Benwood, W. Va., after a shutdown of 20 months, and as the first steel has been made, it is expected that some of the pipe furnaces will resume this week. In general, the pipe making capacity in this part of the country is operating close to 80 per cent. Prices are very firm and while costs have come down in the past five or six weeks, there still is very little margin as between them and selling prices. Discounts are given on page 1537.

Wire Rods.—There is still sufficient demand to

absorb all current offerings and the market is firm at recent levels. On early deliveries, makers here still find it possible to obtain \$47.50 base for soft rods.

We quote No. 5 common basic or Bessemer rods to domestic consumers, \$45 to \$47.50; chain rods, \$46 to \$47.50; screw stock rods, \$50 to \$52.50; rivet and bolt rods and other rods of that character, \$45 to \$47.50; high carbon rods, \$52 to \$57.50, depending on carbon, per gross ton, f.o.b. Pittsburgh or Youngstown.

Billets, Sheet Bars and Slabs.—The Carnegie Steel Co. to-day announced a price of \$36.50 per gross ton for sheet bars for first quarter of 1923, delivered. This announcement probably definitely establishes the market on billets, sheet bars and slabs at that figure, which is about half way between what buyers have fixed as their price limit, and what independent mills had been quoting against most inquiries. The Carnegie Steel Co. did not make any definite announcement as to prices of billets and slabs, but it is safe to assume that these forms will not command any more than sheet bars, especially as the latter in the past have commanded a premium. While sales of forging billets lately have been made as high as \$47.50, the more common maximum has been \$45, and now that prices on soft billets have been reduced, it is probable that forging steel will be obtainable at lower prices. It is doubtful whether spot tonnages of billets, sheet bars and slabs can be sold to-day at any higher than \$36.50, Pittsburgh, or Youngstown.

We quote 4 x 4-in. soft Bessemer and open-hearth billets, \$36.50; 2 x 2-in. billets, \$36.50; Bessemer sheet bars, \$36.50; open-hearth sheet bars, \$36.50; slabs, \$36.50; forging billets, ordinary carbons, \$43 to \$45, all f.o.b. Pittsburgh or Youngstown mills.

Sheets.—Except on automobile sheets, independent manufacturers have generally adopted for first quarter business the reaffirmed prices of the leading interest. All makers are heavily booked on automobile sheets, and independent producers do not see the need of meeting the Steel Corporation price, in view of the fact that the latter has practically no surplus tonnage of full finished stock available for first quarter shipment. So far, there have been no important price concessions from the regular quotations, and announcement by the Steel Corporation of \$36.50 for first quarter sheet bars is likely to stabilize the raw material at that level and prevent much shading of prices in finished products. Mill operations still are averaging above 80 per cent of capacity with the leading interest at 81 per cent. Prices are given on page 1537.

Tin Plate.—The market does not show the activity that was expected to follow the establishment of prices for the first quarter and first half of 1923. January requirements of can makers rarely are heavy, but their specifications for shipments that month are as large as they usually are. Independent makers, with the exception of one or two small ones, who cannot operate profitably at the price, have adopted the reaffirmed Steel Corporation quotation of \$4.75 per base box, Pittsburgh.

Iron and Steel Bars.—Prices of soft steel bars depend largely on the order books of makers. As a general rule the price here is 2c. base, Pittsburgh, because mills here appear to have fairly good backlogs. This price probably would be shaded by mills which need orders, and it is generally accepted that mills having a public quotation of 2c. will accept the first quarter requirements of their so-called preferential customers at 1.90c. This is the usual concession made to such buyers. There is no special activity in concrete bars, prices of which are on the same base as soft bars. Iron bars are unchanged.

We quote steel bars rolled from billets at 2c.; reinforcing bars, rolled from billets, 2c. base; rail steel reinforcing bars, 1.90c. to 2c.; refined iron bars, 2.60c. in carloads, f.o.b. mill, Pittsburgh.

Steel Rails.—Although the demand for light rails often before has been heavier than it is now, the market actually is slightly stronger than it has been as a result of the action of one maker in advancing its price from 2c. to 2.15. base. All makers in this district rolling these sections from new steel now are quoting 2.15c. base.

We quote 25 to 45-lb. sections, rolled from new steel, 2.15c. base; rolled from old rails, 2c. base; standard rails, \$43 per gross ton mill for Bessemer and open-hearth sections.

Structural Material.—It is the experience of most fabricating shops that the inquiry is unusually good for this time of year, and hopes run strong that spring construction will start on as large a scale as it ended this fall. Plain material is had at 2c. for structural beams, but this is well above prices named by fabricators seeking protection on tonnages for later shipment. Prices are given on page 1537.

Plates.—Competition for passing business is sharper in this line than in most others, and price cutting is more frequent. Few large inquiries are reaching this market in spite of car and tank orders which are being placed in the Middle West. Bids close next Monday on 10 barges asked for by the Government, bids to go to Rock Island, Ill. Prices are given on page 1537.

Boiler Tubes.—Makers of steel tubes are heavily committed and not showing much desire for more business except for deferred delivery. Present orders are sufficient to keep capacity well engaged for from 60 to 90 days. Makers of iron tubes are unable to promise deliveries on new orders until after the turn of the new year. Discounts are given on page 1537.

Cold-Finished Steel Bars and Shafting.—It is commented upon that for a market that is not extremely active, prices are showing remarkable firmness. Deviations from the established price of 2.50c. base Pittsburgh are practically unknown. Buyers are specifying well on contracts and we note one new order for 1100 tons. The strength of the market may be accounted for largely by the fact that the indications are that most makers will be unable to place their first quarter contract, except at higher prices than the tonnages now reaching them on old contracts. Ground shafting holds unchanged at 2.90c. base, f.o.b. mill for carloads.

Track Fastenings.—It is reported that some of the Eastern makers of small spikes lately have gone as low as \$3.25 base per 100-lb. Pittsburgh, to secure orders, but locally there has been no deviation from \$3.50 base. Makers here are well filled up on both standard and small spikes and are not yet anxious enough for new business to meet outside competition. On track bolts, the going price for carload lots now is \$3.75, base per 100-lb. Prices are given on page 1537.

Hot Rolled Flats.—Makers in this district are holding firmly to 2.90c. base, Pittsburgh, on the general run of business, but makers of cold-rolled strips are said to be covered at 2.75c. base, and on hoops and bands, more especially the latter, 2.75c. is fairly frequent. Prices are given on page 1537.

Cold-Rolled Strips.—The regularly established price of 4.50c. base, Pittsburgh, still is finding close observance.

Bolts and Nuts.—This market is quiet and no more than steady. The approach of inventory season makes for conservatism about specifications. No announcement yet has been made about first quarter prices, but the impression is that present quotations will be continued. Discounts are given on page 1537.

Rivets.—We note no further change in prices since a week ago. Specifications are as large as they ever are at this time of the year. First quarter prices have not yet been announced. Prices and discounts are given on page 1537.

Coke and Coal.—Production of beehive oven coke has caught up with and passed consumption and the market is lower and weak. On standard furnace grades, \$7 is now maximum on either spot tonnages or December contracts, and spot sales have been made as low as \$6.50, and on coke, good enough for blast furnaces in periods of shortage, as low as \$6 has been done. Foundry grade is held as high as \$8.50 by one or two makers, but as a general rule \$8 has been the recent maximum, and good foundry coke has been sold as low as \$7.50. There are also ample supplies of coal for current requirements and efforts to maintain prices are unavailing. Steam coal is quotable anywhere from \$2.25 to \$3 per net ton at mines for mine run, coking coal from \$3 to \$3.75 and mine run gas from \$3.50 to \$4.

Old Material.—There has been no special change

in prices since a week ago but the undertone of the market is weak because there is so little interest in supplies on the part of important consumers. Activity has subsided very materially in the Youngstown district in the past few weeks, and mills there not only have stopped buying, but a number of them, presumably to avoid large tonnages in their inventories, are holding up shipments. Eastern mills seem to be well fortified against their immediate requirements and local mills consequently have less competition for current offerings than was the case a short time ago. There is a disposition on the part of steel makers in this district to press this advantage fully and to wait on lower prices before buying. Foundry grades are very dull.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel.....	\$20.50 to \$21.00
No. 1 cast, cupola size.....	22.50 to 23.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; and Franklin, Pa.....	21.50 to 22.00
Compressed sheet steel.....	22.00 to 22.50
Bundled sheet sides and ends....	17.50 to 18.00
Railroad knuckles and couplers..	22.00 to 22.50
Railroad coil and leaf springs..	22.00 to 22.50
Low phosphorus standard bloom and billet ends.....	24.00 to 24.50
Low phosphorus, plates and other grades	23.00 to 24.00
Railroad malleable.....	21.00 to 21.50
Iron car axles.....	28.00 to 29.00
Locomotive axles, steel.....	23.00 to 24.00
Steel car axles.....	22.00 to 22.50
Cast iron wheels.....	22.00 to 22.50
Rolled steel wheels.....	22.00 to 22.50
Machine shop turnings.....	16.00 to 16.50
Heavy steel axle turnings.....	17.50 to 18.00
Short shoveling turnings.....	17.50 to 18.00
Cast iron borings.....	17.50 to 18.00
Heavy breakable cast.....	18.50 to 19.00
Stove plate	17.00 to 17.50
Sheet bar crop ends.....	23.50 to 24.00
No. 1 railroad wrought.....	20.00 to 20.50

Youngstown Sheet & Tube Co. Not in Merger Plans

YOUNGSTOWN, Dec. 5.—The Youngstown Sheet & Tube Co. is not at this time involved in any merger plans, says President James A. Campbell. He states that late building operations have stimulated demand for such steel products as wire nails, standard merchant pipe and conduit. Buying of nails is heavier than in several seasons. Mr. Campbell looks for a better winter business for the steel industry than he did several weeks ago, when he predicted that plants would maintain 60 per cent operations.

To Appeal for Higher Pig Iron Tariff

The American Pig Iron Association and the Eastern Pig Iron Association are considering an appeal to President Harding and the United States Tariff Commission to increase the duty on foreign pig iron, which is now 75c. per gross ton. Under the Fordney-McCumber tariff bill the President is authorized, upon recommendation of the Tariff Commission, to increase or decrease any duty by not more than 50 per cent. If the President were to exercise his power, the most that he could increase the pig iron tariff is 37½c. per ton, which makes the full tariff \$1.12½. Under the Payne-Aldrich tariff the rate was \$2.50.

Decrease in Alabama Iron Stocks

BIRMINGHAM, Dec. 5.—Alabama furnace stocks as of Dec. 1 show a decrease of 26,000 tons. The totals of Nov. 1 and Dec. 1 were: Foundry, 82,000 and 62,000 tons; machine cast, 9400 and 3900; warrants, 1300 and 700 tons; basic, 9800 and 9900 tons; totals, 102,000 and 76,000 tons. Some makers were cleaned out.

The Markle Warehouse Association, Houston, Tex., jobber in plates, shapes, bars, etc., has opened a warehouse in New Orleans.

Chicago

Pig Iron Prices Give Ground But Steel Strong with Filled Order Books

CHICAGO, Dec. 5.—Pig iron prices continue to give ground, although a large volume of inquiry has developed. Finished steel, however, is firm, with local mills shipping less than they are booking. The leading interest continues to quote 2c., Chicago, on bars and 2.10c. on plates and shapes, but is unable to promise definite delivery in view of heavy forward commitments. The Inland Steel Co., which recently opened its books for the first quarter, now has little tonnage left for that delivery. The large obligations of Chicago mills are enabling Eastern producers to take tonnage in this territory for early shipment at Pittsburgh base quotations, ranging from 1.90c. to 2c. on plates, shapes and bars.

Demand for heavy material for railroad cars and oil storage tanks is unabated. The Chicago, Milwaukee & St. Paul has increased its recent orders to 7500 cars and the Northern Pacific to 3000 cars, while the St. Louis Southwestern has closed for 1200 cars. Car purchases within the past two weeks will put close to 100,000 tons of steel on local mill books. Building construction is also holding up, but new steel business from general sources has fallen off to some extent, as it generally does during the holiday season. Consumption, however, is well maintained and the temporary pause in buying will have little effect on the mills in their present strong position.

The Illinois Steel Co. has added a blast furnace at Joliet but otherwise the production situation is unchanged. Works managers look forward to the winter with apprehension as they have been unable to build up adequate reserve stocks of fuel. Railroad congestion and car shortage, which are bound to be felt if severe weather comes, are likely to result in the curtailment of furnace and mill operations.

Pig Iron.—Local prices have receded to a common level of \$28 base, furnace, for both prompt and first quarter delivery. In territory intermediate between Chicago and other producing centers, even lower prices have been named. Detroit and Toledo producers are now quoting \$26 base, furnace, and are making their competition felt deep into what is regarded as Chicago territory. A Benton Harbor, Mich., melter, for instance, has placed 1500 tons of malleable for the first quarter with a Detroit furnace. Southern iron has been exceedingly weak within the past week but now shows signs of stiffening. One Southern furnace was in the market for a few days at \$21 base, Birmingham, and after booking about 15,000 tons withdrew. So far as can be learned none of this iron was sold in this district. Another Southern maker sold 15,000 tons to a Birmingham cast-iron pipe manufacturer and has withdrawn all quotations. Recent sales of Southern foundry in this district were made at \$22, base Birmingham, and in two instances at 50c. under that price, but so far as can be ascertained no Southern furnaces are now quoting less than \$23, with two asking \$25. A large volume of inquiry has developed, indicating that the actual needs of melters are greater. The American Radiator Co. is sounding the market for 50,000 tons for all of its plants, while a Chicago district melter wants 7500 tons of foundry iron for the first quarter. A Kewanee user is inquiring for 2600 tons of Northern and Southern foundry iron for the first quarter and another Illinois melter is in the market for 3000 tons of foundry for first half. There are numerous other inquiries ranging from 250 to 1000 tons. Selling is also on a broader scale. First quarter contracts recently closed cover 1500 tons of malleable, bought by a down-State melter, 1000 tons of malleable purchased by a Wisconsin user and 1000 tons of foundry for a Michigan consumer. Whether a buying movement is about to develop is still uncertain. Further delay may, in fact, have results contrary to those expected by melters. The fuel supply of furnaces is not yet large enough to fortify them against interruptions in railroad service, which generally accompany spells of severe weather.

Producers are confronted with added uncertainty as to the quality of fuel. For some time they have been forced to take their share of pooled lake coal which has not been up to standard, and even the all-rail, low volatile coal which they are now receiving is to some extent off grade. The shortage of anthracite coal in the East has created an unusual demand for low volatile fuel needed in coking operations. A local buyer has purchased 500 tons of foreign low phosphorus iron containing a trace of copper for delivery to a plant on the Eastern seaboard; the price is reported to have been about \$26.50, tidewater, duty absorbed. Silvery has dropped another \$2.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	\$36.15
Northern coke, No. 1, sil. 2.25 to 2.75	28.50
Northern coke, foundry No. 2, sil. 1.75 to 2.25	28.00
Malleable, not over 2.25 sil.	28.00
Basic	28.00
High phosphorus	28.00
Southern, No. 2	\$28.01 to 29.01
Low phos., Valley furnace, sil. 1 to 2 per cent copper free	37.00
Silvery, sil. 8 per cent	40.29

Ferroalloys.—Melters in this district are contracting for their 1923 requirements in 50 per cent ferro-silicon. Otherwise the ferroalloys are quiet.

We quote 80 per cent ferromanganese, \$107.56, delivered; 50 per cent ferrosilicon, \$80 to \$85, delivered; spiegeleisen, 18 to 22 per cent, \$46.05 to \$47.05, delivered.

Plates.—Of 11,000 freight cars ordered last week, 9700 will be built in the Chicago district. Fully 78,000 tons of plates, shapes and bars are involved and will be furnished by local mills. Oil storage tank construction continues to be a feature of the market. Besides 22,000 tons of tankage now pending, a much larger tonnage will be called for if the programs of the Standard and Sinclair companies are carried out. In view of the heavy commitments of local mills to car builders, there is some question whether all the plate needs of oil companies can be taken care of here. The leading interest has a heavy backlog and is taking no business for specific shipment. The foremost independent, which recently opened its books for first quarter, now has comparatively little tonnage left to sell for that delivery. Eastern mills are booking prompt material in this territory at from 1.90c. to 2c., base Pittsburgh. Local tank fabricators are bidding on 1200 tons of plate work for a pipe line at Honolulu.

The mill quotation is 2.10c. to 2.30c., Chicago. Jobbers quote 2.90c. for plates out of stock.

Cast Iron Pipe.—Chicago has awarded 1550 tons to the United States Cast Iron Pipe & Foundry Co. Charles M. Porter, Chicago, is low bidder on the general contract for 400 tons for Mt. Prospect, Ill. This pipe is not likely to be bought until spring. Little further pipe buying is expected until after Jan. 1.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$55.20 to \$56.20; 6-in. and above, \$51.20 to \$52.20; class A and gas pipe, \$3 extra.

Rails and Track Supplies.—Specifications continue heavy but new business is rather light.

Standard Bessemer and open-hearth rails, \$43; light rails rolled from new steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 2.85c. to 3c. mill; track bolts with square nuts, 3.85c. to 4c., mill; iron tie plates, 2.50c.; steel tie plates, 2.35c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.50c. base and track bolts, 4.50c. base.

Bars.—While new business in soft steel bars is not so heavy as a month or two ago, this is to be expected, as buying is never so brisk during the holidays and inventory season. Consumption, however, is being main-

tained in all directions and bookings of local mills are still in excess of shipments. Farm implement manufacturers, whose operations have not averaged over 30 per cent, expect to increase their outputs and are inquiring for considerable tonnage for first quarter. The leading mill has a heavy hangover into next year and the Inland Steel Co., which recently opened its books for first quarter, is now practically sold up for that period. Eastern mills continue to book tonnage for prompt shipment at 1.90c. to 2c., Pittsburgh. Bar iron has weakened and is now available at 2.35c., mill. New business is still slack, but the Republic Iron & Steel Co. resumed operations to-day after several weeks of idleness. Part of its output, however, will be puddled coupling iron. Rail steel bars remain firm at 2c., mill, but demand is lighter from some sources, notably bedstead manufacturers are reinforcing bar sellers.

Mill prices are: Mild steel bars, 2c. to 2.10c. Chicago; common bar iron, 2.35c. to 2.50c., Chicago; rail steel, 2c., Chicago mill.

Jobbers quote 2.80c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.80c. for rounds and 4.30c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.50c. base; hoops, 4.15c.; bands, 3.55c.

Wire Products.—The production situation shows no improvement; in fact, the output of the leading interest was below recent levels last week owing to a shutdown on Thanksgiving, Friday and Saturday for inventory. There is a seasonal let-up in the demand for barbed wire, although some orders are being received for delivery after the first of the year. Woven wire fence business is good. In general, wire and nail production is not yet equal to the needs of users. Wire rods continue in active demand, a current inquiry from a nail manufacturer calling for 1000 tons. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 1537.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire and No. 9 and heavier bright basic wire, \$3.30 per 100 lb.; common wire nails, \$3.45 per 100 lb.; cement coated nails, \$2.90 per keg.

Bolts and Nuts.—Sellers have opened their books for first quarter at the September discounts, but as yet have closed few contracts. Buyers continue to pursue a waiting policy in the hope that prices will weaken.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to $\frac{3}{4}$ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, \$2.75 off; blank nuts, \$2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off.

Reinforcing Bars.—Bookings in concrete bars are not only unusually heavy for this season, but are practically as large as at any time this year. For one important seller, last week was the largest in 1922 in tonnage sold. Another prominent dealer closed an aggregate of 3000 tons during the week, much of which represented individual sales of less than 100 tons. The unusual activity of the building industry and the firmness of mill prices have finally made themselves felt in warehouse quotations. Sellers now have large backlogs and are not disposed to take further business at concessions. The warehouse quotation of 2.50c., which was in effect some time ago, is again generally adhered to. Recent lettings include:

Toby Rubovits, printing building, Chicago, 250 tons to Concrete Steel Co.

Foundation, Elks Club building, Milwaukee, 200 tons to Corrugated Bar Co.

Harsh-Chapline Shoe Co., factory, Milwaukee, 260 tons to Corrugated Bar Co.

Primalt Products Co., plant, Chicago, 250 tons to Corrugated Bar Co.

American Butter Co., warehouse, Kansas City, 100 tons to Concrete Steel Co.

Aquitania Hotel, building, Chicago, 500 tons to American System of Reinforcing.

Illinois State road work, 800 tons to Kalman Steel Co.

Harrison Street viaduct, Chicago, 100 tons to Kalman Steel Co.

Shoe factory extensions for Harsh & Chapline Co. at Milwaukee, 260 tons to Corrugated Bar Co.

Creamery for Fairmont Creamery Co. at Green Bay, Wis., 200 tons to Kalman Steel Co.

Garage for Chippewa Valley Auto Co., Chippewa Falls, Wis., 190 tons to Truscon Steel Co.

Pending work includes:

Foundations for new Strauss building, Chicago, 100 tons. Addition to the Rochester Packing Co. plant, Rochester, N. Y., 150 tons to the Corrugated Bar Co., of Buffalo.

Sheets.—Local mills are practically sold up for first quarter and in some cases were unable to allot to customers all the tonnage desired. Users will probably turn to outside sources for their remaining requirements, although Eastern mills have not yet closed many first quarter contracts. They continue to book considerable prompt business, however.

Mill quotations are 3.35c. for No. 28 black, 2.50c. for No. 10 blue annealed and 4.35c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote f.o.b. Chicago, 4c. for blue annealed, 4.85c. for black and 5.85c. for galvanized.

Structural Material.—Chicago building permits in November showed a substantial gain over October and, in fact, exceeded those of any prior month of the year except March and June. Fabricating awards and inquiries continue to hold up remarkably well. Bids will be taken Dec. 6 on the Roosevelt road viaduct of the Chicago Union Station, a project involving 3000 tons. The new Chicago Tribune building, the design of which has just been adopted, will require about 5000 tons. The activity of fabricating shops is indicated by their purchases of prompt material from Eastern mills to supplement what they are getting from local sources.

The mill quotation on plain material is 2.10c. to 2.20c., Chicago. Jobbers quote 2.90c. for plain material out of warehouses.

Old Material.—Large railroad accumulations continue to be offered on the market, further accentuating the weakness of prices. Declines this week, however, are not so general as a week ago, a fact which may be ascribed to fair sized purchases of open-hearth grades by two leading steel mills. Demand from other sources, however, remains unusually light. Notwithstanding the augmented supply of scrap, certain specialties are still scarce, notably couplers and knuckles, coil springs, steel wheels, iron arch bars and iron angle bars. Railroad offerings include the Louisville & Nashville, 6000 tons; the Northwestern, 4500 tons; the Belt Railway of Chicago and the Pere Marquette, 1000 tons each, and the Erie a blank list.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	\$22.50 to \$23.00
Cast iron car wheels	24.00 to 24.50
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Rolled or forged steel car wheels	22.00 to 22.50
Rails for rolling	17.50 to 18.00
Steel rails, less than 3 ft.	18.50 to 19.00
Heavy melting steel	17.00 to 17.50
Frogs, switches and guards cut apart	17.00 to 17.50
Shoveling steel	16.50 to 17.00
Drop forge flashings	12.00 to 12.50
Hydraulic compressed sheet	13.50 to 14.00
Axle turnings	15.00 to 15.50

Per Net Ton

Iron angles and splice bars	21.00 to 21.50
Steel angle bars	16.00 to 16.50
Iron arch bars and transoms	21.00 to 21.50
Iron car axles	24.00 to 24.50
Steel car axles	17.50 to 18.00
No. 1 busheling	13.75 to 14.25
No. 2 busheling	9.00 to 9.50
Cut forge	15.00 to 15.50
Pipe and flues	10.50 to 11.00
No. 1 railroad wrought	15.00 to 15.50
No. 2 railroad wrought	15.00 to 15.50
Steel knuckles and couplers	19.50 to 20.00
Coil springs	21.00 to 21.50
No. 1 machinery cast	19.50 to 20.00
No. 1 railroad cast	18.00 to 18.50
Low phosph. punchings	17.00 to 17.50
Locomotive tires, smooth	15.50 to 16.00
Machine shop turnings	9.25 to 9.75
Cast borings	13.00 to 13.50
Stove plates	16.00 to 16.50
Grate bars	16.00 to 16.50
Brake shoes	16.00 to 16.50
Railroad malleable	20.00 to 20.50
Agricultural malleable	20.00 to 20.50

New York

Increased Activity in Pig Iron—Large Order for Cast Iron Pipe for Porto Rico

NEW YORK, Dec. 5.—Buying of pig iron is much more active and the volume of business transacted in the past week makes an excellent showing compared with the smaller tonnages of earlier weeks. The sales have not perhaps footed up as rapidly as in other sections of the country, and price concessions have not been so marked in eastern Pennsylvania and Virginia as in Buffalo. One agency took orders for 8500 tons, representing for the most part lots of from 100 to 500 tons. New England malleable interests in the last two weeks have purchased fully 10,000 tons. Most of the buying of foundry and malleable irons has been for first quarter, and a boiler company which sent out an inquiry for 2000 tons has purchased a part of the tonnage, taking foreign iron. Another transaction was 1200 tons, divided between Scotch and Buffalo irons. A melter of considerable importance, after sending out an inquiry for 6000 tons for first half, bought a part of the tonnage at Buffalo. A New Jersey melter bought 3000 tons for first quarter. Numerous inquiries ranging from 100 to 500 tons have appeared. On foreign iron, prices are lower. French iron, analyzing 2.25 to 2.75 per cent silicon and 1 to 1.50 per cent phosphorus, can be had at \$24, Philadelphia. On Scotch, the usual quotation is now about \$27.50, duty paid, with \$25 to \$27 being quoted on Continental grades, the lowest quotations being on unsold iron in this country which was imported some time ago.

We quote delivered in the New York district as follows, having added to furnace prices \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25.....	\$33.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	32.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	29.27
Buffalo, sil. 1.75 to 2.25.....	29.91
No. 2X Virginia, sil. 2.25 to 2.75.....	34.44
No. 2 Virginia, sil. 1.75 to 2.25.....	33.44

Ferroalloys.—Demand for ferromanganese and spiegeleisen is confined to small lots for early delivery at prevailing prices. There are also a few inquiries for ferromanganese totaling several hundred tons. No activity is noted in the manganese ore market. Some contracts for 1923 delivery of 50 per cent ferrosilicon have been made at \$82.50, freight allowed, which is now the quotation for any delivery. The price of ferrochromium, containing 4 to 6 per cent carbon, for 1923, is 14c. per lb. of contained chromium, freight allowed, and contracts for next year's consumption are being negotiated. Quotations are as follows:

Ferromanganese, domestic, furnace, nominal per ton.....	\$100.00
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port.....	\$100.00
Spiegeleisen, 17 to 19 per cent, furnace.....	\$36.00
Spiegeleisen, 20 per cent, furnace or duty paid.....	\$37.00 to \$38.00
Ferrosilicon, 50 per cent, delivered, per gross ton, carloads.....	\$82.50
Ferrotungsten, per lb. of contained metal, 90c. to 95c.....	
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered.....	14c.
Ferrovandium, per lb. of contained vanadium.....	\$3.50 to \$4.00
Ferrocobaltititanium, 15 to 18 per cent, in carloads, per net ton.....	\$200.00
Ores	
Manganese ore, foreign, per unit, c.i.f. 29c. to 30c.	
Tungsten ore, per unit, in 60 per cent concentrates, nominal.....	\$7.50 to \$8.50
Chrome ore, basis 48 per cent Cr ₂ O ₃ , crude, per ton, c.i.f. Atlantic seaboard.....	\$18.00 to \$28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₃ , New York.....	55c. to 60c.

Cast Iron Pipe.—Some large buyers are beginning to place orders for spring delivery. Prices are firm and unchanged. Among recent awards are the 2500 tons of 6-in. to 36-in. pipe for the city of Boston, and the 20,000 tons of 30-in. pipe for the city of San Juan, Porto Rico, both of which went to the United States Cast Iron Pipe & Foundry Co. On the latter tender, foreign competition was encountered, a Belgian bid being third lowest. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$54.50; 4-in. and 5-in., \$59; 3-in., \$64.80, with \$4 additional for Class A and gas pipe. Soil pipe discounts are unchanged in this market, but some slight tendency

to shade is reported. Purchases are now being made for January-February delivery and later next year and orders for immediate shipment are still unusually good for this season. We quote discounts of both Southern and Northern makers, delivered New York, as follows: 2 to 6-in. standard, 33 to 35% per cent off list; heavy, 43 to 45% per cent off list.

High Speed Steel.—The market continues quiet and prices unchanged at from 75c. to 80c. per lb. for 18 per cent tungsten high speed steel, with special brands of some companies ranging up to 90c. per lb.

Warehouse Business.—Although there is no change in prices on most iron and steel items out of stock, black and galvanized sheets are slightly weaker, particularly the latter, which have declined to as low as 5.25c. per lb. on some recent sales. The current market on black is from 4.50c. to 4.75c. per lb. and galvanized sheets are not quotable on a basis higher than 5.50c. per lb. Difficulty is still reported in obtaining shipments and even the sheet sellers, although inclined to shade prices, admit that there are delays on shipments from mill. Steel pipe discounts are unchanged and business continues fair, despite the lateness of the season. With the copper market stronger, brass and copper warehouses report their products out of stock firm at prevailing quotations. We quote prices on page 1554.

Finished Iron and Steel.—Consumers and jobbers in the New York territory have begun to contract on a small scale for first quarter. It is notable that with the possible exception of tin plate, buyers are not covering ahead for their full requirements, there still being some hesitancy as to prices notwithstanding the firmness with which they have held in recent weeks. Except on plates, which are obtainable in large lots at 1.90c. to 1.95c., Pittsburgh, there is no price cutting of importance. The market on shapes and bars, so far as the mills are concerned, holds at 2c. and concessions from this price which have been reported are said to be due to offerings of material for resale, but even this factor is disappearing, as fabricators and jobbers see a good demand for steel products during the first quarter of the year. Most of the tin plate mills have opened their books for the first half to consuming buyers and for first quarter to jobbers, quotations being uniform at \$4.75 per base box, Pittsburgh. A liberal volume of business has already gone on mill books and considerable more will be closed before the end of the year. Other contracting is principally in shapes, bars, cold finished steel and wire products, with some in pipe. Structural steel projects show a total of more than 16,000 tons in awards in the Eastern district during the past week, including the towers for the Delaware River Bridge at Philadelphia, totaling 9500 to 10,000 tons, while new work on which figures are being put in totals about 7000 tons. Concrete construction calls for only a moderate amount of bar tonnage, but many projects will come up early in the new year on which preliminary figures have been submitted. For a filtration plant at Indianapolis 1100 tons of concrete bars are required. The Concrete Steel Co. has been awarded 600 tons for a power plant to be erected by the Foundation Co. at Philo, Ohio; 750 tons for the Rich department store at Atlanta, Ga.; 350 tons for the St. Francis Convent at Dubuque, Iowa, and 335 tons for a warehouse in Philadelphia. One of the largest plate jobs being figured on is for steel pipe for Honolulu, H. I., which requires 800 tons of plates, and 3000 tons will be required for a water main in Brooklyn for the Board of Water Supply of New York.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, structural shapes and steel plates, 2.39c.; bar iron, 2.34c.

Coke.—The market seems to be slightly stronger, but this strength is not reflected in quotations, which remain about \$8 to \$8.50 for foundry and \$6.50 to \$7 for furnace, while by-product is still quoted at \$14.84 to \$14.91, delivered, Newark and Jersey City points.

Old Material.—Prices are holding fairly firm on practically all items. Heavy melting steel is still quoted at from \$12.50 to \$13.50 per ton, based upon purchases for Alan Wood Iron & Steel Co., at \$16 delivered and to a Pottsville mill at \$16.50, which at the

\$3.78 freight rate, brings the buying price New York to \$12.72 per ton. The Bethlehem Steel Co. and the Jones & Laughlin Steel Co. are both active, the former specifying railroad steel and the latter railroad or equivalent. Buying is also being done for Midland and Monessen. Stove plate is quotable at \$12.25 to \$13.25 per ton, with Mahwah, N. J., quiet and \$16 per ton being paid for a Harrisburg, Pa., consumer, which figures back to a buying price New York of \$12.20 per ton. On specification pipe, \$14 per ton is being paid for a Lebanon mill, which is about the only active buyer at present. A small tonnage of machine shop turnings is reported to have been shipped to a Phoenixville mill at \$14.50 per ton.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$12.50 to \$13.50
Steel rails, short lengths, or equivalent	14.25 to 14.75
Rails for rolling.....	16.00 to 16.50
Relaying rails, nominal.....	21.00 to 22.00
Steel car axles.....	No market
Iron car axles.....	25.00 to 26.00
No. 1 railroad wrought.....	15.00 to 15.50
Wrought iron track.....	14.25 to 14.75
Forge fire	11.00 to 11.50
No. 1 yard wrought, long.....	13.50 to 14.00
Cast borings (clean).....	12.50 to 13.00
Machine-shop turnings.....	11.00 to 11.50
Mixed borings and turnings.....	11.00 to 11.50
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	9.75 to 10.25
Stove plate	12.25 to 13.25
Locomotive grate bars.....	13.00 to 13.50
Malleable cast (railroad).....	13.50 to 14.00
Cast-iron car wheels.....	16.50 to 17.50

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton, follow:

No. 1 machinery cast.....	19.00 to 20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	17.00 to 17.50
No. 1 heavy cast, not cupola size	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.)	13.50 to 14.00

Birmingham

On Some Sales \$23 Has Been Shaded, But Market Is Now Firmer

BIRMINGHAM, ALA., Dec. 5.—Hammering of the Birmingham iron market seemed to have come to an end last week, after three makers had booked about 50,000 tons in a week, two of them went out of the market for the time being. The maker beginning the marking down process was one of those quitting the market on disposing of all surplus iron and booking the greater portion of first quarter capacity of its one-stack plant. The other maker quitting the market also booked the greater part of a one stack first quarter capacity, but, in order to get a start, one maker took several thousand tons under \$23, cutting that price, in some instances, down to approximately \$21. Other makers enter stout claim to having done nothing under \$23. Advices from competitive sales markets confirm numbers of sales of 1000-ton lots at that base. At the close of the week the absolute bottom of the market seemed to be \$23. The Tennessee company had not been heard from in the booking, neither had much been heard from the two largest foundry iron makers. The 50,000 tons was placed half in the South and half in the Middle West. Confirmation of the reported purchase of 50,000 tons of Birmingham iron by the United States Pipe & Foundry Co. at \$22 to \$23 is not obtainable here. The two largest interests deny having sold any tonnage to that company recently, but one pipe company has bought lots of 1000 to 3000 tons from various makers in the past month, paying the market prices, such as \$23 and \$24 and is credited with having taken some of the iron offered at one time at \$21. A large foundry interest to-day booked lots of 1000 and 2000 tons at \$23 and \$23.50, and another booked 800 tons at \$23.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon, 1.75 to 2.25.....	\$23.00
Basic	23.00
Charcoal, warm blast.....	32.00

Cast Iron Pipe.—Presumably the 3,000-ton pressure pipe order placed for Los Angeles came to a Birmingham shop, but to which is not known yet. The pressure pipe base remains at \$43 with little new business. Soil pipe is dull at \$55 for standard and \$45 for extra heavy. The Alabama By-Products Co. will buy 4½ miles of 12-in. gas pipe for its gas main to East Birmingham fac-

tories to be constructed at once. The National Cast Iron Pipe Co. will, this month, increase capital stock from \$500,000 to \$1,000,000. It will build a new foundry for the manufacture of pipe by the centrifugal or De Lavaud process.

Finishing Mills.—Steel corporations and independent steel mills maintain full turn in practically every instance. The Chickasaw Shipbuilding & Car Co. is averaging 20 to 25 new steel cars and a like number of repairs a day. The Tennessee company's rail mill continues on its 10,000-ton turn. Wire drawing mills have all they can care for. Structural steel is fairly active. Bars are very active. The Steel Voyager leaving Mobile last week carried 2400 tons of rails to Yokohama, 1560 tons of rails to Yokkaichi and a large tonnage of splice bars and angle bars, nuts and bolts to these places and Darien.

Old Material.—Scrap is beginning to show a little more life following the low stocks on yards of steel scrap users and dealers are not forced to shade the quotations.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$16.00 to \$17.00
No. 1 steel.....	14.00 to 16.00
No. 1 cast.....	18.00 to 20.00
Car wheels	18.00 to 20.00
Tramcar wheels	17.00 to 19.00
Stove plate	16.00 to 17.00
Cast-iron borings	9.00 to 10.00
Machine shop turnings.....	9.00 to 10.00

Boston

First Quarter Iron Sold with Buffalo Getting Most of the Business

BOSTON, Dec. 5.—Further shrinkages in prices quoted by domestic furnaces and by holders of foreign iron induced fairly liberal purchases for 1923 first quarter delivery, during the past week. Aggregate bookings exceeded 10,000 tons, more than 80 per cent of which was Buffalo, and the rest western and eastern Pennsylvania, charcoal and foreign iron. Buffalo iron sold at \$25 furnace base, and included tonnages running as high as silicon 4 to 5 per cent, the largest individual transaction being 3000 tons taken by a machinery maker. Western Pennsylvania iron, with a freight rate equivalent to the Buffalo, sold at \$26 base. Eastern Pennsylvania sold in a small way at \$27 furnace base. Virginia furnaces dropped their price to \$28 furnace base with the regular 50c. differential, but failed to get much business, nor was much Alabama sold, even at \$23 furnace base. Both Lake and Massachusetts charcoal iron sold in limited tonnages, the furnace at Richmond Furnace, Mass., having blown in for a short run. Some holders of foreign iron, especially foundries, which resold, disposed of iron at a material loss. Limited tonnages of Scotch, silicon 2.50 plus, sold at \$28 f.o.b. dock, duty paid, which represented a loss of more than 50c. a ton, while other holders let go at less than \$27 f.o.b. shipping point. Continental irons sold at \$26 f.o.b. dock, duty paid, and more for less than \$26, while German iron, with analysis guaranteed, was offered dealers at \$26 f.o.b., duty paid. English irons are obtainable at \$26 or less, duty paid.

We quote delivered prices on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia and \$9.60 from Alabama:

Eastern Penn., sil. 2.25 to 2.75.....	\$31.15 to \$32.15
Eastern Penn., sil. 1.75 to 2.25.....	30.65 to 31.65
Buffalo, sil. 2.25 to 2.75.....	29.91 to 31.41
Buffalo, sil. 1.75 to 2.25.....	29.91 to 30.91
Virginia, sil. 2.25 to 2.75.....	34.42
Virginia, sil. 1.75 to 2.25.....	33.92
Alabama, sil. 2.25 to 2.75.....	33.10
Alabama, sil. 1.75 to 2.25.....	32.60

Finished Material.—The George W. Harvey Co., Boston, has awarded approximately 2000 tons of structural steel to the New England Structural Co., also of that city, for the Fourth Atlantic National Bank Building. All bids for a local municipal police station, involving 700 tons, were rejected, and the project is up for refiguring. During the past week, local mill representatives booked a good business in all but concrete bars, most of it on a 2c f.o.b. Pittsburgh base, although 1.95c was done. Practically all bars are for immediate

shipment, indicating small stocks in manufacturers' hands. A moderate tonnage of sheets and tin plate also was taken. Some of the New England street railway companies are in the market for frogs, switches, etc., and requirements will run considerably in excess of those a year back. One carrier is inquiring on an additional 500 tons of 50-lb. rails, having placed the bulk of its requirements previous to the last advance in prices. The call for forgings is limited.

Iron Imports.—During the week ending Dec. 2, 2,100 tons of Middlesbrough, England, iron was brought into this port. During the previous week, 1322 tons of Belgian and 2150 tons of Scotch, a total of 3,832 tons, arrived.

Warehouse Business.—The movement of iron and steel out of warehouses is remarkably good for this time of the year, continued open weather being a market factor in small construction work calling for finished materials. Prices on iron and steel are steady and unchanged. With the exception of stove and tap bolts, which are unchanged, local bolt and nut quotations are approximately 5 per cent higher, making machine bolts 40 per cent discount. Washers are quoted as heretofore. Steel goods of all kinds are up 15 to 20 per cent.

Jobbers quote: Soft steel bars, \$3.065 per 100 lb. base; flats, \$3.85; concrete bars, 3.16½c.; structural steel, \$3.065 to \$3.50; tire steel, \$4.50 to \$4.85; open-hearth spring steel, \$5 to \$6.50; crucible spring steel, \$12; steel bands, \$4.25; hoop steel, \$4.75; cold rolled steel, \$4 to \$4.50; refined iron, \$3.065; best refined iron, \$4.50; Wayne iron, \$5.50; Norway iron, \$6.60 to \$7.10; plates, 3.16½c. to \$3.35; No. 10 blue annealed sheets, \$4.15 per 100 lb. base; No. 28 black sheets, \$5.40; No. 28 galvanized sheets, \$6.40.

Coke.—Both the New England Coal & Coke Co. and the Providence Gas Co. continue to quote foundry coke on a basis of \$16 delivered within the \$3.10 freight zone. This price is the same as named in November. Both companies are doing better in the matter of deliveries, and foundries in this territory are specifying liberally. Connellsville foundry cokes are still available at \$1 and more under the market for local fuel, but foundries show little interest due to the uncertainty of getting shipments through unless a lot of red tape is involved.

Old Material.—New business continued at a minimum the past week, and purchases against old contracts were limited. A further readjustment of prices in general has taken place, the market evidently trying to reach a level where buying will be stimulated. Heavy melting steel apparently is holding better than other materials, \$14 shipping point having been paid for several car lots, which represents the top of the previous week's market. Mixed borings and turnings are not coming on the market as freely as heretofore, yet tonnages were bought for shipment to West Virginia at \$11 on cars shipping point, off 50c. a ton. Chemical cast iron borings are easier, \$17 and \$16.50 on cars shipping point having been done early in the week. While the market to-day is \$16 to \$16.50. Selected cotton ties fetched \$11 shipping point, but ordinary kinds were bought at \$9. Limited tonnages of No. 1 machinery cast changed hands at \$20 shipping point, but 90c. a 100 lb. is the common price demanded by holders. The embargo situation is easier on both scrap and pig iron, permits being freer on those lines embargoed, while some carriers have temporarily lifted embargoes.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery.....	\$20.00 to \$22.00
No. 2 machinery cast.....	18.00 to 20.00
Stove plate.....	16.50 to 17.00
Railroad malleable.....	20.50 to 21.00
Bundled sheets.....	14.00 to 14.50
Car wheels.....	20.00 to 20.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$13.50 to \$14.00
No. 1 railroad wrought.....	13.00 to 13.50
No. 1 yard wrought.....	11.00 to 11.50
Wrought pipe (1-in. in diam., over 2 ft. long).....	9.50 to 10.00
Machine shop turnings.....	10.00 to 10.50
Cast iron borings, rolling mill.....	12.00 to 12.50
Cast iron borings, chemical.....	16.00 to 16.50
Blast furnace borings and turnings.....	10.50 to 11.00
Bundled forged scrap.....	11.00 to 11.50
Regular forged scrap and bundled skeleton.....	9.50 to 10.00
Axles.....	20.00 to 20.50
Shafting.....	19.00 to 19.50
Rails for rolling.....	15.00 to 15.50

Cincinnati

Southern Pig Iron Sold at \$21, But \$23 Now Seems Minimum

CINCINNATI, Dec. 5.—The market is undoubtedly more active and inquiries especially are more numerous and for fair-sized tonnages. Prices continue weak, although in the Birmingham district furnaces are now making a more determined effort to stop the decline. One Southern furnace on Wednesday announced a price of \$21, Birmingham, and after booking 12,000 tons, withdrew from the market. Most of this tonnage was placed in the Southern market, about 4,000 being for shipment into St. Louis, Chicago and Cincinnati districts. A Louisville sanitary manufacturer, which the week before bought 4000 tons, took an additional 1000 at the low price. So far as reported, no other furnaces have followed this lead, and in fact one interest which had been a seller at \$23, advanced to-day to \$25. Three of the larger producers are now holding to this figure, with one other interest asking \$24. The Northern market is weak. With the exception of iron from the Ironton district, which is quoted at \$27, \$26 appears to be the market. A radiator manufacturer is reported to have placed about 20,000 tons for first quarter, the iron being divided between lake front, Valley and Buffalo furnaces, the latter business going at \$25. French Iron is reported to have been offered at \$21, alongside New York, which undoubtedly accounts for weakness in Eastern prices. Silvery prices have been cut \$2 per ton, the 8 per cent grade now being quoted at \$35.50, Jackson County furnace. Inquiries pending include one for 2000 tons from a Kokomo, Ind., stove maker, one for 1000 tons from an Indianapolis melter, and 1000 tons each from two Michigan stove manufacturers. A Southern melter is inquiring for 1000 tons of malleable, and a northern Ohio interest is asking for 500 to 1000 tons. Several other inquiries for 100 to 500 tons are current. A sale of 500 tons of Southern iron was made to-day on the basis of \$23, Birmingham.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$27.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft).....	27.55
Ohio silvery (nominal), 8 per cent.....	37.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2).....	29.27
Basic Northern.....	28.27
Malleable.....	29.27

Warehouse Business.—Local jobbers report business continuing brisk, deliveries apparently being the most important factor in the demands of consumers. While buying is of the hand-to-mouth character, the number of orders brings the actual tonnages up to a very good aggregate, and it is expected that current buying will continue throughout the month. There is a better demand for wire products for January and February shipment, and nails are also much in demand. Prices are unchanged.

Cincinnati jobbers quote: Iron and steel bars, 2.95c. base; reinforcing bars, 3.05c. base; hoops, 4.05c. base; bands, 3.85c. base; shapes and plates, 3.05c. base; cold-rolled rounds, 3.75c. base; cold-rolled flats, squares and hexagons, 4.25c. base; No. 10 blue annealed sheets, 4c.; No. 28 black sheets, 4.70c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, \$3.10 per 100 lb.; common wire nails, \$3.20 per keg, base.

Finished Material.—There is a fair demand for bars, shapes and plates for immediate shipment, but sheets have dropped off considerably, and while some inquiries are current, these are generally for carload lots for fill-in purposes. Independent sheet mills generally are quoting 2.60c. for blue annealed, 3.35c. for black and 4.35c. for galvanized sheets, with 4.95c. to 5c. being the prevailing quotation on auto body sheets. These prices are not quoted for the entire first quarter, as the mills are inclined to book only for December and January delivery. Some first quarter contracts have been made on bars, shapes and plates at 2c., but the tonnages involved are small and 1.95c. more nearly represents the general market for early delivery on these products, with reports of 1.90c. having been done. An inquiry for 1000 tons of bars, noted last week, failed to bring out a better price for first quarter than

2c., and the inquirer has decided to wait a while before placing the order. On wire and wire products, the demand is looking better, and some orders for January shipment have been placed by jobbers. Coal mining communities are showing some activity in light rails, and reports of fair sized tonnages being placed are being made. In the structural field, no new inquiry has come out, and the lettings are light, in no case being for more than 100 tons. A number of projects under consideration, however, will likely be up for bids within the next week or two. Most of these buildings will be of concrete construction. The Mengel Body Co., Louisville, Ky., took bids Dec. 4 on a body-building plant, 500 tons of steel being required. The Masonic Temple, Muncie, Ind., has been awarded to the Indiana Bridge Co., and this company is inquiring for 900 tons of shapes for the job. A school building at Williamsburg, Clermont Co., Ohio, is up for bids, the steel involved being 200 tons.

Coke.—Coke consumers are asking operators to hold up shipment of December quotas on contracts, the idea apparently being to show a light inventory. The demand is light, with prices showing no change from last week.

Old Material.—Local dealers report little activity in scrap markets, the consumers apparently being satisfied to let matters drift until the situation as to price trend becomes more clear. Prices are undoubtedly weak, but deals are so scarce that it is almost impossible to figure what quotations are.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	\$13.50 to \$14.00
Iron rails	16.50 to 17.50
Relaying rails, 50 lb. and up	26.00 to 26.50
Rails for rolling	17.50 to 18.00
Heavy melting steel	16.50 to 17.50
Steel rails for melting	15.50 to 16.50
Car wheels	19.50 to 20.00

Per Net Ton	
No. 1 railroad wrought	14.00 to 14.50
Cast borings	11.50 to 12.00
Steel turnings	11.00 to 11.50
Railroad cast	17.00 to 18.00
No. 1 machinery	20.50 to 21.00
Burnt scrap	11.50 to 12.00
Iron axles	20.00 to 20.50
Locomotive tires (smooth inside)	14.00 to 15.00
Pipes and flues	10.50 to 11.00

Buffalo

Pig Iron Declines \$1 and Market Shows Much More Activity

BUFFALO, Dec. 5.—The pig iron market is considerably livelier with the base price touching the low figure of \$25 for silicon 1.75 to 2.25. All but one of the selling agencies have done a lively business, and from the manner in which big users are manifesting interest, the general impression is that consumers feel that at \$25 base the bottom has been touched. Several attractive inquiries are out involving tonnages up to 5000 tons. One furnace considers itself out of the market by reason of the continued price weakening and will not compete for first quarter business at \$25 base, believing that a stronger market is not far away. Malleable weakening is on the same ratio as foundry iron. There is no likelihood of any increased furnace operation with the possible exception of the Donner Steel Co., which may start its Tonawanda furnace, should the market reach a firmer base.

We quote f.o.b. per gross ton Buffalo as follows, the higher price being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil.	\$26.00
No. 2X foundry, 2.25 to 2.75 sil.	25.50
No. 2 plain, 1.75 to 2.25 sil.	25.00
Basic	26.00
Malleable	25.00
Lake Superior charcoal	36.28

Finished Iron and Steel.—Tubular products and wire material continue to represent the high levels of finished material demand. Bars, shapes and plates are moving on an even keel. Rumors of a price of 1.95c. on bars have been circulated, but specific information is lacking as to any selling material at this price. Larger sheet business developed from some quarters following the announcement of the Steel Corporation's schedule of 3.35c. and 4.35c. for black and galvanized respectively.

Reinforcing bar demand is good in the light of the fact that the season is virtually closed, but the leading bar maker is well supplied with orders involving less than 100 tons. Shipments on wire and pipe production are behind schedule and delivery pressure is strong.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.20c.; plates, 3.20c.; soft steel bars, 3.10c.; hoops, 4.10c.; bands, 3.90c.; blue annealed sheets, No. 10 gage, 4.05c.; galvanized steel sheets, No. 28 gage, 5.85c.; black sheets, No. 28, 4.85c.; cold rolled round shafting, 3.95c.

Warehouse Business.—The volume of orders now being filled in local warehouses is greater than at any other time this year, but individual orders do not call for the tonnages sought some time ago. Prices are firm, in line with the stabilized mill schedules. The usual December quietness is not apparent this year.

Old Material.—Trade between dealers is virtually the only activity of any importance in used material, although tentative inquiries have been put out by several big consumers involving important tonnages. Several mills might be interested in purchases of steel at an attractive figure, but not on the basis of current quotations. Dealers expect a livelier market after the holiday season. The largest individual user of steel is out of the market temporarily, deliveries on old contracts being sufficient for present requirements.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	\$19.00 to \$19.50
Low phos., 0.04 and under	21.00 to 22.00
No. 1 railroad wrought	18.00 to 19.00
Car wheels	21.00 to 22.00
Machine-shop turnings	14.50 to 15.50
Cast iron borings	16.00 to 16.50
Heavy axle turnings	17.50 to 18.50
Grate bars	16.00 to 17.00
No. 1 busheling	16.50 to 17.50
Stove plate	17.00 to 18.00
Bundled sheet stampings	14.00 to 15.00
No. 1 machinery cast	20.00 to 21.00
Hydraulic compressed	17.00 to 17.50
Railroad malleable	20.50 to 21.50

St. Louis

Decided Increase in Interest in Pig Iron—Coke Market Active

ST. LOUIS, Dec. 5.—A marked increase in interest is being shown by melters in first quarter requirements of pig iron. That interest extended as far as the issuance of inquiries for more than 25,000 tons of foundry iron and about 4000 tons of malleable iron, all of Northern make. Just how much of this will develop into orders and at what price is problematical. There is no question that the melters who have been doing a big business are in need of iron or will be shortly. The market is nominally at \$30, Chicago, but it is believed that this price can be shaded, but just how much will develop with the placing of orders covered by the inquiries referred to. The market for Southern iron remains at \$23, Birmingham, 500 tons—300 for December shipment and 200 for January shipment—and several carlots being sold at that figure. Several concerns are still quoting \$24, Birmingham, and are holding at that figure.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago, \$3.28 from Birmingham (rail and water), \$5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25	\$32.16
Northern malleable, sil. 1.75 to 2.25	32.16
Basic	32.16
Southern foundry, 1.75 to 2.25	28.17

Finished Iron and Steel.—Business in all lines is rather quiet. Railroads are buying very little, the only inquiry of note being one for 100 tons of tank plates, issued by the Missouri Pacific. One line centering here bought 75 tons of locomotive tires. Fabricators report very little business in prospect. Jobbers continue to buy nails.

For stock out of warehouse we quote: Soft steel bars, 2.90c. per lb.; iron bars, 2.90c.; structural shapes, 3c.; tank plates, 3c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 3.90c.; structural rivets, 3.85c. per 100 lb.; boiler rivets, 3.95c.; tank rivets, $\frac{3}{4}$ in. and smaller, 55 per cent off list; machine bolts, large, 50 per cent; smaller, 50 per cent; carriage bolts, large, 45 per cent; small, 45 per cent; lag screws, 55 per cent; hot pressed nuts, square or hexagon blank, \$2.75; and tapped, \$2.75 off list.

Coke.—The market for coke is extremely active. Buyers are insisting on shipments and are stressing their need for the fuel. The outstanding feature of the week was the shipment of a solid trainload of 53 cars of coke from the St. Louis Coke & Chemical Co., Granite City, to the Metropolitan Utilities at Omaha, Neb., the shipment leaving at 2 o'clock Friday afternoon for 24-hr. delivery by the Burlington. The coke was needed to prevent a shut-down of the plant.

Old Material.—The market for old material is unchanged. Consumers are not buying anything and hardly are expected to do so until after the first of the year. In the meantime, dealers are not taking on any new purchases, although considerable material is coming in, the result of purchases made some time ago and held up on account of the railroad strikes. The only new railroad list out is from the Pennsylvania System (Southwestern Region), 4800 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$20.00 to \$20.50
Rails for rolling	16.50 to 17.00
Steel rails, less than 3 ft.	20.00 to 20.50
Relaying rails, standard section	26.00 to 29.00
Cast iron car wheels	23.00 to 23.50
Heavy melting steel	16.00 to 16.50
Heavy shoveling steel	15.50 to 16.00
Frogs, switches and guards cut apart	16.50 to 17.00
Per Net Ton	
Heavy axles and tire turnings	11.50 to 12.00
Steel angle bars	17.00 to 17.50
Iron car axles	26.00 to 26.50
Steel car axles	19.00 to 19.50
Wrought iron bars and transoms	21.50 to 22.00
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.00 to 15.50
Railroad springs	20.00 to 20.50
Steel couplers and knuckles	20.00 to 20.50
Cast iron borings	10.50 to 11.00
No. 1 busheling	13.00 to 13.50
No. 1 railroad cast	19.00 to 19.50
No. 1 machinery cast	20.00 to 20.50
Railroad malleable	18.00 to 18.50
Machine shop turnings	9.50 to 10.00

Cleveland

Low Prices Bring Out Large Volume of Orders at Detroit, But Cleveland Melters Fail to Respond

CLEVELAND, Dec. 5.—The ore shipping season closed Dec. 2 with the dispatch of a cargo from Escanaba, only one cargo being shipped this month. The movement by water during the season was 42,613,184 gross tons. November shipments, including the one cargo of 9626 tons shipped during December, amounted to 3,420,560 tons. The season closed with a good supply of ore in the hands of consumers, the amount at furnace yards and on lower lake docks on Dec. 1 being estimated at 43,000,000 tons. The tabulation of shipments by ports during the past season will be found in another column.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$5.95; Old range non-Bessemer, 51½ per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51½ per cent iron, \$5.05.

Pig Iron.—Considerable activity in pig iron has developed in the Michigan territory. A number of round-lot sales of foundry and malleable iron were made during the week to some of the largest consumers in Detroit, and other Michigan consuming points for the first quarter delivery, and a number of inquiries are pending. One producer is working on inquiries aggregating over 25,000 tons in lots up to 3,000 tons and the heavy buying is expected to last another week. Prices considerably lower than have been prevailing recently were quoted and these apparently have stimulated the buying. As low as \$26 is being quoted for shipment to Michigan points and there are reports that outside furnaces have sold foundry and malleable iron for Detroit delivery at approximately \$26, Detroit. However, a Detroit producer announces that it is now holding to \$27 furnace for both Detroit and outside delivery. The buying has been done by some of the largest consumers in the automotive field and by three or four of the large

Detroit stove companies. Co-incident with the weakening of the Detroit market has come another reduction of \$1.50 to \$2 a ton in Cleveland prices. The decline in the local market appears largely due to the competition of Buffalo iron, which has been offered in Cleveland at \$25 for foundry grades, equivalent to \$27.65 delivered. Local furnaces seem disposed to name prices that will shut out outside iron and have marked down foundry iron to \$27.50 delivered Cleveland, but for outside shipment are quoting \$26.50. Based on these prices a few small lot sales are being made, but the market in this territory continues rather quiet. Another \$2 price reduction has been made on Ohio silvery iron.

We note the sale of several lots of silvery iron aggregating 400 tons at the new schedule. Southern foundry iron has been quoted at \$21, Birmingham, but the tonnage offered at that price appears to have been quickly sold and the price withdrawn before any sales were made in this territory. Another producer to-day reduced its price \$1 a ton to \$22. During the week before the reduction several first quarter contracts were booked at \$23. Low phosphorus iron has sold at \$36, or \$1 below the recent price.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron includes a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and a \$6 rate from Birmingham.

Basic, Valley furnace (nominal)	\$26.50
Northern No. 2 fdy., sil. 1.75 to 2.25	27.50
Southern fdy., sil. 1.75 to 2.25	29.00
Malleable	27.50
Ohio silvery nominal, sil. 8 per cent	38.52
Standard low phos., Valley furnace	37.00

Bolts, Nuts and Rivets.—Some contracts for bolts and nuts for the first quarter delivery are being placed at present prices by automobile manufacturers, implement manufacturers and railroads, but jobbers are holding off until after inventory time. There is a fair volume of current orders. The leading local rivet manufacturer has met the competition of the Pittsburgh district makers and reduced prices \$3 a ton to 3c for structural and 3.10c for boiler rivets. These prices have been quoted on some first quarter inquiries that have appeared. Small rivets are also weaker, being quoted as low as 65 and 10 per cent off list.

Reinforcing Bars.—General contracts have been placed for the Jefferson and Longfellow Schools, Cleveland, each requiring 100 tons of reinforcing bars. Hard steel reinforcing bars are not firm, although 2c. is still the common price for car lots.

Sheets.—While there has been shading of \$1 to \$2 a ton on black sheets, most mills seem to be holding firmly to the American Sheet & Tin Plate Co. prices, and considerable business is being booked for deliveries extending through the first quarter. Independent mills are booking large tonnages in automobile body sheets for the first quarter. On these they are adhering to 5c.

Semi-Finished Steel.—Sales in small lots are reported at \$37.50, but the market appears to be represented by a range of \$37 to \$38, Youngstown, for sheet bars, billets and slabs. Some inquiry is coming out for sheet bars for the first quarter, but quotations have not yet been made.

Finished Material.—Deliveries by some of the mills have improved to such an extent that some consumers are getting material sooner than they expected, and will not place additional orders with mills that can make early shipments. Large buyers are well covered and new business is mostly in small lots from the smaller consumers. Automobile companies are not rushing to buy steel for the first quarter and inquiries from that source are said to be largely of a tentative nature. Automobile plants are reported to be operating at a greater capacity than at this time in any previous year. Although steel bars can be purchased at 1.95c., 2c. is by far the more common quotation, and the leading interest is understood to be adhering to the latter price. Plates are weak, evidently due to the fact that some mills are in need of orders for immediate rolling. On an attractive plate inquiry for several thousand tons an independent mill is understood to have quoted below 1.90c. On the other hand, another mill reports the sale of 1470 tons in three lots for field tanks at 2c. For

car lots 2c. is usually the minimum price, but for larger lots 1.95c. is being openly quoted. A Sharon plant has taken an order for oil refinery equipment requiring 1000 of plates for which it has sent out an inquiry. The 3000 tons for a boat for the Huron Transportation Co., taken by the Toledo Shipbuilding Co., has not yet been placed. In the structural field, the Niagara, Lockport & Ontario Power Co., Niagara Falls, has taken bids for transmission towers requiring 4000 tons of structural material. The Cleveland Board of Education has placed general contract for two school buildings each requiring small tonnages of steel and will place 10 additional school houses as soon as plans can be prepared.

Jobbers quote steel bars, 2.91c.; plates and structural shapes, 3.01c.; No. 9 galvanized wire, 3.30c.; No. 9 annealed wire, 2.80c.; No. 28 black sheets, 4.15c. to 4.40c.; No. 28 galvanized sheets, 5c. to 5.40c.; No. 10 blue annealed sheets, 3.70c. to 3.76c.; hoops and bands, 3.71c.; cold-rolled rounds, 3.75c.; flats, squares and hexagons, 4.25c.

Coke.—We note the sale of 6000 tons of Virginia foundry coke for the first quarter to a sanitary interest at \$8. Connellsville foundry coke is moving in small lots at \$8 to \$8.50 for standard makes.

Old Material.—The scrap market is dull and inclined to weakness. Heavy melting steel has declined 25c to 50c a ton and a greater decline is noted on a few other grades. Small purchases of heavy melting steel were made during the week by Valley district mills at \$21 and dealers are offering \$20 to \$20.50 for this grade for Youngstown delivery. Local mills are out of the market. The trade expects little activity in the market until January. Railroad lists pending or on which bids were received during the week include scrap offerings by the Pennsylvania, New York Central, Erie and Big Four.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$18.25 to \$18.50
Steel rails under 3 ft.....	19.75 to 20.00
Steel rails for rolling.....	20.00 to 20.50
Iron rails.....	18.00 to 18.50
Iron car axles.....	25.00 to 26.00
Low phosphorus melting.....	20.00 to 20.50
Cast borings.....	15.75 to 16.00
Machine shop turnings.....	14.50 to 14.75
Mixed borings and short turnings.....	15.50 to 16.00
Compressed steel.....	16.50 to 16.75
Railroad wrought.....	17.00 to 17.50
Railroad malleable.....	20.00
Light bundled sheet stampings.....	13.00 to 13.50
Steel axle turnings.....	16.00 to 16.50
No. 1 cast.....	20.50 to 21.00
No. 1 busheling.....	12.50 to 13.50
Drop forge flashings over 10 in.....	12.75 to 13.25
Drop forge flashings under 10 in.....	12.50 to 13.50
Railroad grate bars.....	17.00 to 18.00
Stove plate.....	17.00 to 18.00
Pipes and flues.....	13.00 to 13.75

Detroit Scrap Market

DETROIT, Dec. 5.—Lettings on tonnages for December delivery have developed the fact that there were a smaller number of dealers bidding for this tonnage. The following prices are on a gross ton basis f.o.b. cars producer's yards, excepting stove plate, automobile and No. 1 machinery cast, which are quoted on a net ton basis:

Heavy melting steel.....	\$14.50 to \$15.50
Shoveling steel.....	15.00 to 16.00
No. 1 machinery cast.....	19.00 to 21.00
Cast borings.....	12.00 to 13.50
Automobile cast scrap.....	21.00 to 23.00
Stove plate.....	16.50 to 18.00
Hydraulic compressed.....	14.50 to 15.50
Turnings.....	11.50 to 12.50

An examination for an electrical engineer for the dredge construction service, War Department, carrying a \$4,000 to \$6,000 salary, is announced by the United States Civil Service Commission, Washington, to which application should be made asking for form 2118, stating title of the examination desired.

The timber lands of the Buckeye Furnace Co., at Wellston, Ohio, have been purchased by the George D. Baker Co., Washington Court House, Ohio. These lands formerly supplied the wood for the charcoal pits of the Buckeye furnace.

Philadelphia

More Pig Iron Inquiry for First Quarter-Steel Demand Also Improves

PHILADELPHIA, Dec. 5.—Signs that buyers now recognize that pig iron prices have about reached bottom are at hand in belated inquiries for fairly large tonnages from several important melters in the East, and the Eastern pig iron trade is cheered by the prospect of a good buying movement for first quarter. A half dozen or more inquiries on which eastern Pennsylvania furnaces have quoted total upward of 20,000 tons of iron, which is more than has been in the market at any one time since the critical period of the coal strike. An increasing demand for steel products, especially plates, which have been exceedingly dull, is also a development of early December, and is somewhat surprising in view of the fact that this is usually a very inactive month in steel buying. A small volume of contracting has been done in steel products for first quarter, principally bars, shapes, tin plate, sheets and pipe, but there is apparently a reviving interest among buyers not usually in evidence at the tag end of a year.

Ore.—Last week's receipts of ore included 7692 tons of iron ore from Sweden and 2500 tons of chrome ore from South Africa.

Ferroalloys.—An increasing demand for ferromanganese has developed within the past two weeks. The Lavino Furnace Co. is getting its Marietta furnace in readiness for operation, but has no definite plans as to when it will be blown in. Domestic alloy is quoted at \$100, furnace, and the imported at \$100, Atlantic seaboard, duty paid.

Pig Iron.—Not a great deal of inquiry for pig iron has developed in the immediate Philadelphia territory, but melters in New England and in the New York district have come into the market for fairly large tonnages in the past week or 10 days and some buying has been done. Recent inquiries include 3000 tons from the Richardson-Boydton Co., (placed) 2000 tons from the Burnham Boiler Corporation, 2000 tons from the Essex Foundry Co., 2500 tons from the Central Foundry Co., with older inquiries of 1000 tons from the Westinghouse Electric & Mfg. Co., 1000 tons from the Saco-Lowell Shops and several thousand tons from the H. B. Smith Co. still pending, while the Draper Corporation, which was in the market for 8000 tons, has closed for 550 tons of foundry iron. While a good deal of the business which emanates from territory reached by Buffalo furnaces may go to that district because of the lower prices on Buffalo iron, this is regarded favorably by Eastern Pennsylvania furnace operators because it will tend to lessen Buffalo competition. A report that the American Radiator Co. is about to close for 20,000 tons of Buffalo iron was regarded as a good omen for the recovery of pig iron buying throughout the East. The United States Cast Iron Pipe and Foundry Co. has been a fairly large buyer in the East. It was awarded 20,000 tons of water pipe for San Juan, P. R., and presumably is covering on the iron required for this work. Prices on foundry iron quoted by eastern Pennsylvania furnaces have gone no lower within the week, but \$27, furnace, for No. 2 plain and \$28 for No. 2X are more openly named on inquiries. One or two furnaces are attempting to get 50c. a ton higher, but with little success so far. Foreign iron of a grade equivalent to No. 2X is quoted at \$27, Philadelphia docks, duty paid. Last week's receipts of European iron at the port of Philadelphia were 20,943 tons, of which 13,857 tons came from England, 1900 tons from France, 4436 tons from Belgium and 750 tons from Scotland. This is the largest movement in any one week this year. Another record was broken when one ship brought 8500 tons, the largest single cargo which has been received, it is stated, at any Atlantic port. Basic pig iron was sold at \$26.50, furnace, in a transaction involving 1500 tons. An Eastern steel company is negotiating for 2500 tons, which probably will be bought this week. Copper free low phosphorus iron is now being offered at \$35, Standish fur-

nace. Imported iron of this grade is being offered at about \$30, Philadelphia, duty paid. The Emporium furnace in western Pennsylvania has gone in blast. The furnace of the Delaware River Steel Co. at Chester will probably become active about Jan. 1.

The following quotations are with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to \$1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.....	\$28.14 to \$28.64
East. Pa. No. 2X, 2.25 to 2.75 sil.....	29.14 to 29.64
East. Pa. No. 1X.....	30.14 to 30.64
Virginia No. 2 plain, 1.75 to 2.25 sil.....	33.17 to 34.17
Virginia No. 2X, 2.25 to 2.75 sil.....	34.17 to 35.17
Basic delivered eastern Pa.....	27.50 to 28.00
Gray forge.....	28.14 to 28.64
Malleable.....	30.64 to 31.64
Standard low phos. (f.o.b. furnace).....	35.00
Copper bearing low phos. (f.o.b. furnace).....	32.00 to 35.00

Semi-Finished Steel.—Eastern mills quote \$38 to \$40, Pittsburgh, on open-hearth rerolling billets and \$42.50 to \$45, Pittsburgh, on forging quality. Little business is being done.

Plates.—A quickening in the demand for plates has been a development of the past week, although it has been necessary for mills to go to 1.95c., Pittsburgh, in most instances to close desirable orders. This is to-day's market on large lots, but 2c. is being obtained on small lots. There are reports also of 1.90c., Pittsburgh, but whether a price as low as this is being made by any interest other than Carnegie Steel Co. is not fully determined. Recent purchases by the Pennsylvania and Philadelphia & Reading Railroads were probably made at not more than 1.95c. A shipbuilder in the market for 700 tons has stated that it will buy at 1.85c., Pittsburgh, but there is nothing to indicate that the business has been closed at this or any other price. A few small contracts for first quarter have been made at 2c., Pittsburgh.

Structural Shapes.—The largest business in structural steel closed in this district in a long time is the order for about 10,000 tons of plates and shapes for the towers of the Delaware River Bridge, awarded to the Bethlehem Steel Bridge Corporation. It is expected that requests for bids on a part of the superstructure, requiring about 30,000 tons, will be out soon. Plain material holds at 2c., Pittsburgh, and though there are reports of concessions of \$1 a ton these are not definitely established.

Bars.—A good demand for steel bars has come up within the past week, largely for early delivery, but some first quarter contracts have been made at 2c., Pittsburgh. Prices hold firm, with the possible exception of some cutting on concrete reinforcing bars, and this, it is said, has not been done by the mills. Bar iron is quoted at 2c., Pittsburgh, but concessions are occasionally offered on fairly large lots, a carload or more. Bolt, nut and rivet makers are making contracts for first quarter on the basis of the discounts given on fourth quarter contracts.

Sheets.—Blue annealed sheets are obtainable at 2.50c. to 2.60c., Pittsburgh; black sheets at 3.25c. to 3.35c. and galvanized at 4.25c. to 4.35c., Pittsburgh, but it is stated that the concessions on black and galvanized have been offered mainly by one Ohio mill which recently started operations.

Warehouse Business.—Demand for steel out of stock has dropped off slightly. Concessions in prices are reported to have been given by some jobbers. We quote for local delivery as follows:

Soft steel bars and small shapes, 3.025c.; iron bars (except bands), 3.025c.; round edge iron, 3.20c.; round edge steel, iron finish, $1\frac{1}{2}$ x $\frac{1}{2}$ in., 3.20c.; round edge steel planished, 4c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 3.125c.; tank steel plates, $\frac{1}{4}$ -in., 3.33c.; blue annealed steel sheets, No. 10 gage, 3.85c.; black sheets, No. 28 gage, 4.60c.; galvanized sheets, No. 28 gage, 5.75c.; square twisted and deformed steel bars, 3.15c.; structural shapes, 3.125c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.80c.; $\frac{1}{2}$ -in., 5c.; spring steel, 4.25c.; round cold-rolled steel, 3.85c.; squares and hexagons, cold-rolled steel, 4.35c.; steel hoops, No. 13 gage and lighter, 4.25c.; steel bands, No. 12 gage to $\frac{1}{2}$ -in., inclusive, 3.825c.; rails, 3.025c.; tool steel, 8.50c.; Norway iron, 6.50c.

Coke.—There is a good deal of a spread in coke prices. Blast furnace coke of standard quality is obtainable from \$6.50 to \$7, Connellsville, and foundry

coke at \$7.50 to \$8.50, depending upon quality. Heating coke is offered at \$6 to \$6.50, Connellsville.

Old Material.—Prices on all grades of scrap seem to have reached a point of resistance, and for the first time in many weeks there are no declines. The explanation is that most of the scrap dealers are indifferent about selling at current levels. Machine shop turnings for steel works or rolling mills are about 50c. a ton higher.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$16.00 to \$16.50
Scrap rails.....	16.00 to 16.50
Steel rails for rolling.....	19.50 to 20.00
No. 1 low phos., heavy 0.04 and under.....	22.00 to 23.00
Cast iron car wheels.....	20.00 to 21.00
No. 1 railroad wrought.....	19.00 to 20.00
No. 1 yard wrought.....	17.00 to 17.50
No. 1 forge fire.....	15.00 to 15.50
Bundled sheets (for steel works).....	14.50 to 15.00
No. 1 busheling.....	14.50 to 15.00
Turnings (short shoveling grade for blast furnace use).....	14.50 to 15.00
Mixed borings and turnings (for blast furnace use).....	14.50 to 15.00
Machine shop turnings (for steel works use).....	15.00 to 15.50
Machine shop turnings (for rolling mill use).....	15.00 to 15.50
Heavy axle turnings (or equivalent).....	15.00 to 15.50
Cast borings (for steel works and rolling mills).....	15.00 to 16.00
Cast borings (for chemical plants).....	20.00 to 22.00
No. 1 cast.....	20.00 to 21.00
Heavy breakable cast (for steel plants).....	19.00 to 19.50
Railroad grate bars.....	16.50 to 17.00
Stove plate (for steel plant use).....	16.50 to 17.00
Railroad malleable.....	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications).....	14.00 to 14.50
Shafting.....	21.00 to 22.00
Steel axles.....	22.00

CANADIAN MARKET

Little Interest in Pig Iron—Prices Recently Reduced—Fuel Situation Improves

TORONTO, ONT., Dec. 5.—The Canadian pig iron market shows a lack of interest. With only one month left of the present year, no orders have been closed for iron for first quarter delivery, and even inquiries for this period are absent from the market. It is true, however, that a number of melters in Ontario and Quebec are carrying heavy stocks of English and Scotch iron which was taken in at prices much lower than those quoted by Canadian blast furnace operators. It is reported that shipments of British iron into Ontario and Quebec have ceased with the closing of navigation up the St. Lawrence. There are, however, large tonnages of British iron piled in the vicinity of Montreal from which Quebec melters will be supplied during the winter months. Ontario melters are entering the market from time to time for foundry and malleable iron, but their orders are small and seldom exceed one to two car lots.

While the fuel situation throughout Ontario is much better than it was four or five months ago, there is still considerable room for improvement and at the present time furnaces, mills and foundries are meeting with some difficulty in securing supplies. The present reason for this, however, has more to do with the shortage of cars for transportation purposes than from an actual shortage of fuel at the mines. At the present time the Algoma Steel Corporation, Sault Ste. Marie, Ont., has one furnace blowing on foundry iron; the Steel Co. of Canada, Hamilton, is operating one furnace on basic and proposes to blow in a second on foundry during the next week or two. The Dominion Steel Corporation, Sydney, N. S., has two furnaces blowing, one on basic and one on foundry, and is making preparations to blow in a third in the immediate future.

During the past couple of weeks Canadian furnaces have announced a reduction of \$2.50 per ton in pig iron prices and those now in effect are as follows: No. 1 (2.25 to 2.75 silicon) and malleable, \$33.80; No. 2 (1.75 to 2.25 silicon), \$32.80, Toronto. No. 1 and malleable, \$36.15; No. 2, \$35.15, Montreal. British iron prices are Summerlee and Carron, \$33 to \$35 per ton dock, Montreal.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin		Lead		Zinc	
	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis	
Nov. 29	14.12½	13.62½	35.87½	7.30	6.95	7.40	7.05	
Dec. 1	14.00	13.62½	36.12½	7.30	6.95	7.45	7.10	
2	14.00	13.62½	.....	7.30	6.95	7.45	7.10	
3	14.00	13.62½	36.00	7.30	6.95	7.45	7.10	
5	14.12½	13.75	36.25	7.30	6.95	7.45	7.10	

*Refinery quotation.

New York

NEW YORK, Dec. 5.

Owing to the Thanksgiving holiday and the approach of the end of the year when inventories are taken, the markets are naturally quiet. Prices are firm in all of them, but the buying of copper, tin and zinc have been moderate. The lead market continues the most active of all.

Copper.—The principal news feature of the week is the statement of the acquisition of the Chile Copper Co. by the Anaconda Copper Mining Co. While no official announcement has been made it is generally believed that the deal has gone through. Such a consummation would make the Anaconda company the largest factor in the copper industry, owning as it does the American Brass Co., and it would also remove from the market a large part of the low cost competitive metal refined in South America. Whether due to this probable consolidation or not, prices have stiffened until practically no electrolytic copper is available at less than 14c., delivered, or 13.75c., refinery, at which levels practically all of the moderate demand not prevalent is being satisfied. Lake copper is quoted at 14c. to 14.12½c., delivered.

Copper Averages.—The average price of Lake copper for the month of November, based on daily quotations in THE IRON AGE, was 14.10c. The average price of electrolytic copper was 13.61½c., refinery, or 13.86½c., delivered.

Tin.—The market has been dull and quiet practically the entire week, with consumers more or less indifferent and dealers not active. On Wednesday, Nov. 29, there was a slight pressure to sell and about 100 tons changed hands at around 35.75c. to 36c. On Friday 100 tons of future delivery was sold on the New York Metal Exchange at about 36c. During the week the premium on Straits tin disappeared. Spot Straits tin was quoted to-day at 36.25c., New York, with the London market about £2 per ton higher than a week ago at £176 for spot standard, £177 for future standard and £177 15s. for spot Straits. November deliveries into consumption were 4812 tons and statistics for the month show that the visible supply of tin was increased by 2384 tons. So large an increase was not expected and a declining market has been the result. Imports for the first 11 months of this year have been 53,593 tons, as compared with 20,668 tons for the same period in 1921.

Lead.—Conditions are unchanged and the market is quiet and very firm. The leading interest continues to quote 6.90c., St. Louis, or 7.10c., New York, but independents are quoting 6.95c., St. Louis, or 7.30c., New York. Consumption continues very heavy.

Zinc.—Because of moderate advances in the London market, due to speculation or other causes, the market here has experienced a partial advance during the week so that prime Western zinc is now quoted at 7.10c., St. Louis, or 7.35c., New York, for early delivery. Domestic demand is seasonably light and sales to foreign markets, after a period of inactivity, have again been made in light volume. It is probable that in the last few weeks about 12,000 to 15,000 tons has been sold.

Antimony.—Wholesale lots of Chinese metal for early delivery are quoted at 6.40c. to 6.50c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is unchanged, as imported from foreign producers, at 21c. to 22c. per lb., duty paid, New York, in wholesale lots for early delivery.

Old Metals.—Trading is fairly active though values are not so firm. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.375
Copper, heavy and wire	12.50
Copper, light and bottoms	11.25
Heavy machine composition	10.25
Brass, heavy	8.25
Brass, light	6.50
No. 1 red brass or composition turnings	9.50
No. 1 yellow rod brass turnings	7.75
Lead, heavy	6.25
Lead, tea	5.00
Zinc	5.00

Chicago

Dec. 5.—All of the metals are very dull, but zinc has advanced slightly. Stocks of zinc are said to be low, but consumptive buying has been too light to develop an actual shortage. Speculative influences appear to account for the present price of the metal. We quote, in carload lots, lake copper, 14.37½c.; tin, 37.50c. to 38c.; lead, 7.10c.; spelter, 7.15c.; antimony, 8.50c., in less than carload lots. On old metals we quote copper wire crucible shapes and copper clips, 11.50c.; copper bottoms, 9.75c.; red brass, 9c.; yellow brass, 7c.; lead pipe, 5.25c.; zinc, 4.62½c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin, 30c., all buying prices for less than carload lots.

St. Louis

Dec. 5.—Lead and zinc are strong. We quote lead at 6.97½c. to 7c., carlots, and zinc at 7.10c. to 7.15c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7.50c.; zinc, 2c.; lead, 3c.; pewter, 15c.; tin foil, 20c.; tea lead, 2c.; aluminum, 9c.

Ottawa, Ill. Mill to Resume on Forging Bars

The Alliance Steel Co., 20 West Jackson Boulevard, Chicago, seller of bars, sheets, plates, shapes, etc., has leased the mill of the Central Steel Co., Ottawa, Ill., a plant which has been idle for about nine years. The mill has been changed over from 8 in. to 9 in., and will be motor driven. Operations will be started late this month and production is expected to total about 1200 tons per month. The company will specialize in forging bars and alloy steel for the drop forge and automobile trade. A new continuous heating furnace has been installed, but two old sand bottom oil-fired furnaces will be retained for heating alloy steel. Later it is planned to roll bar size shapes. F. A. Jones is president and treasurer of the company.

The tenth annual meeting of the Compressed Gas Manufacturers' Association will be held at the Hotel Astor, New York, on Jan. 15. The members of the association are manufacturers of oxygen, hydrogen, acetylene, carbonic gas, ammonia, chlorine, sulphur dioxide, blaugas, carbo-hydrogen, etc. Manufacturers of supplies and equipment are associate members of the association. A. R. Brunner, Liquid Carbonic Co., Chicago, is president and John H. Hayes, 120 West Forty-second Street, New York, is secretary.

Preliminary figures indicate that the Trumbull Steel Co., Warren, Ohio, established a new monthly record in November in shipping finished steel products, and that earnings exceeded those of October. Final compilation is expected to show shipments of 32,000 tons of finished steel last month.

The Bonney-Floyd Steel Foundry Co., Columbus, Ohio, has purchased a 3-ton Moore rapid 'Lectromet furnace for its steel foundry.

British Iron and Steel Market

Pig Iron Is Easier — Continental Markets Are Erratic on Fluctuating Exchange—Germany and America Sell Rails to South Manchuria

(By Cable)

LONDON, ENGLAND, Dec. 5.

Railroad rates on fuel, pig iron, ore and steel have been reduced. The market is quiet generally, with an easier tendency. Hematite is firm on sustained demand; prompt supplies are scarce and makers are quoting from January onward.

Foreign ore is weak. Bilbao-Rubio is quoted at 21¼s. to 22¼s. (\$4.94 to \$5.05), ex-ship Tees.

Coke is weak on diminishing export demand and increased production.

Steel business undoubtedly is improving. More works in all parts of the country are re-opening and there is increased ship building under way. One group of steel makers has booked 40,000 tons of ship plates. Japan has bought 2000 tons of ship plates. The Indian railroads are buying wagons (cars), tires and wheels. The home railroads have formed extensive plans for electrification, etc., to relieve unemployment, the work to be commenced immediately.

Continental markets are erratic, owing to the exchange fluctuations and an acute shortage of fuel. German competition is prominent again, the South Manchurian Railroad having bought 5000 tons of rails in Germany; the railroad has also bought 5000 tons in the United States.

India is buying German merchant bars and sheets. Two-inch billets have been done at £5 12½s. (\$25.54) f.o.b., January and February shipment.

Tin plate is steady and there is a fair business for both home and export for early shipment. Tin plate has been sold freely at 19½s. (\$4.43) basis f.o.b. South America is inquiring for 50,000 boxes. China is buying wasters. A small line of oil plates has been done on the minimum basis price.

Galvanized sheets are firmer on account of dearer spelter. There is good inquiry and moderate business. Thin gages have been advanced 10s.

Black sheets are steady. There is good Japanese demand, but there is some difficulty in placing orders owing to the works' quoting for February, March and April delivery. Belgium is competing on the thicker gages.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.54 per £1, as follows:

Durham coke, delivered	£1 8s.	to £1 10s.	\$6.36 to \$6.41
Cleveland No. 1 foundry	4 16½		21.91
Cleveland No. 3 foundry	4 12		20.88
Cleveland No. 4 foundry	4 7½		19.86
Cleveland No. 4 forge	4 2½		18.73
Cleveland basic	4 0		18.16
East Coast mixed	4 13	to 4 13½	21.11 to 21.22
Ferromanganese	15 0		68.10
Ferromanganese*	14 10	to 14 15	65.83 to 66.97
Rails, 60 lb. and up	7 5	to 8 0	32.92 to 36.42
Billets	7 0	to 7 5	31.78 to 32.92
Sheet and tin plate bars,			
Welsh	7 0	to 7 7½	31.78 to 33.48
Tin plates, base box	0 19½	to 0 19¾	4.43 to 4.48
			C. per Lb.
Ship plates	8 10	to 9 0	1.72 to 1.82
Boiler plates	11 0	to 11 10	2.23 to 2.33
Tees	9 0	to 9 10	1.82 to 1.93
Channels	8 5	to 8 15	1.67 to 1.77
Beams	8 5	to 8 15	1.67 to 1.77
Round bars, ¾ to 3 in.	9 0	to 9 10	1.82 to 1.93
Galvanized sheets, 24 g.	17 5	to 17 10	3.50 to 3.55
Black sheets, 24 gage	11 15		2.38
Black sheets, Japanese			
specifications	15 5		3.09
Steel hoops	11 0	& 11 10*	2.23 & 2.33*
Cold rolled steel strip,			
20 g.	22 2½		4.48
Cotton ties, Indian specifications	15 0		3.04

*Export price.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:			
Belgium, Jan., Feb.	£4 10s.		\$20.43
Luxemburg, Jan.,			
Feb.	4 10		20.43
France, Jan., Feb.	4 10		20.43
Billets:			
France, Jan.	5 0	to £5 15s.	22.70 to \$26.11
Luxemburg, Jan.	5 0	to 5 15	22.70 to 26.11
Lorraine, Jan.	5 0	to 5 15	22.70 to 26.11
Wire nails (keg basis):			
Germany	0 14½		3.29
Belgium	0 20½		4.65
Wire rods, 5 mm. (0.2 in.):			
Belgium	7 5	to 10 7½	32.92 to 47.10
Angles:			C. per Lb.
Belgium	7 7½		1.49
Tees:			
Belgium	8 5		1.67
Merchant bars:			
Belgium, Jan., Feb.	6 15		1.37
Luxemb'g, Jan., Feb.	6 15		1.37
France, Jan., Feb.	7 0	to 7 2½	1.42 to 1.44
Germany, Feb., Mar.	6 5	to 6 10	1.27 to 1.32
Joists (beams):			
France, not quoted.			
Belgium, Mar., Apr.	5 10	to 5 17½	1.11 to 1.19
Luxemb'g, Jan., Feb.	5 17½	to 6 2½	1.19 to 1.24
Channels:			
Belgium	7 10	to 7 12½	1.52 to 1.55
¾-in. plates:			
Germany, Jan.	6 5		1.27
Belgium, Jan.	6 7½	to 6 10	1.29 to 1.32
Luxemburg, Jan.	6 5		1.27
France, not quoted.			
No. 8 gage wire:			
Belgium	14 10%		2.95

STANDARDIZED TERMINOLOGY

Management Committee Seeks Definitions of Business Terms

Serious obstacles to the progress of its work were reported by the joint committee on standardization of terminology in industry, at the Dec. 5 meeting of the American Society of Mechanical Engineers in the Engineering Societies Building, New York. Lack of co-operation from the "member" societies was given as the chief hindrance, while funds are needed to prosecute the work. The classification being developed is based on the Dewey decimal system.

In the discussion on the committee's preliminary report it was brought out that, owing to the different conceptions by different men of the meanings of words, one of the first things here needed was a set of definitions. Some minds associate wages with finance, others with personnel, with ideas of management, with the work of the treasurer, or of the accountant. Some regard wages as a matter of incentive. Each of these diverse ideas leads to an attempt to classify wages according to the conception involved. Obviously, the true classification can put wages in one place only.

Frank B. Gilbreth defined the primary purpose of

a classification as one "to bring automatically to one's attention information he did not know existed." He pointed to the necessity of getting together the bulk of the data and material to be classified, before any attempt at classification is made, because the purpose is "to bring related data together." As an aid in this direction, he deprecated the tendency of business publications to publish unrelated articles and data on the front and rear of the same sheet, and advocated running the advertisements on the backs of pages containing editorial matter, in order to make it easy to file the data so published.

Bethlehem and Midvale Officials Inspect Mills

E. G. Grace, president Bethlehem Steel Co., and A. C. Dinkey, president Midvale Steel & Ordnance Co., accompanied by about 30 of the Bethlehem and 15 of the Midvale executive, sales and operating officials, left Monday on a tour of inspection of the Midvale-Cambria properties, which the Bethlehem Steel Co. will shortly take over and operate. The party visited Johnstown, Pa., on Tuesday and inspected the mills, blast furnaces, coke ovens, etc., there and on Wednesday went through the mills at Coatesville, Pa.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates	
Sheared, tank quality, base, per lb.	1.95c. to 2c.
Structural Material	
Beams, channels, etc.	2.00c.
Iron and Steel Bars	
Soft steel bars, base, per lb.	2.00c.
Refined iron bars, base, per lb.	2.60c.
Hot-Rolled Flats	
Hoops, base, per lb.	2.75c. to 2.90c.
Bands, base, per lb.	2.75c. to 2.90c.
Strips, base, per lb.	2.75c. to 2.90c.

Cold-Finished Steels	
Bars and shafting, base, per lb.	2.50c.
Strips, base, per lb.	4.50c.

Wire Products	
Nails, base, per keg.	\$2.71
Bright plain wire, base, per 100 lb.	2.45
Annealed fence wire, base, per 100 lb.	2.45
Spring wire, base, per 100 lb.	3.25 to 3.35
Galvanized wire, base, per 100 lb.	2.95
Galvanized barbed, base, per 100 lb.	3.35
Galvanized staples, base, per keg.	3.35
Painted barbed wire, base, per 100 lb.	3.00
Polished staples, base, per keg.	3.00
Cement coated nails, base, per count keg.	2.20
Woven fence, carloads (to jobbers)	70 1/2 per cent off list
Woven fence, carloads (to retailers)	68 per cent off list

Bolts and Nuts	
Machine bolts, small, rolled threads...	60 and 5 per cent off list
Machine bolts, small, cut threads...	50 and 10 per cent off list
Machine bolts, larger and longer...	50 and 10 per cent off list
Carriage bolts, 3/4 x 6 in.	
Smaller and shorter, rolled threads,	

Cut threads	50, 10 and 5 per cent off list
Longer and larger sizes	50 per cent off list
Lag bolts	60 and 5 per cent off list
Flow bolts, Nos. 1, 2 and 3 heads	50 and 10 per cent off list
Other style heads	20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in.	
Smaller and shorter	45 per cent off list
Larger and longer sizes	45 per cent off list
Hot pressed square or hex. blank nuts	\$3.25 to \$3.50 off list
Hot pressed nuts, tapped	3.25 to 3.50 off list
C.p.c. and t. sq. or hex. nuts, blank	3.25 to 3.50 off list
C.p.c. and t. sq. or hex. nuts, tapped	3.25 to 3.50 off list
Semi-finished hex. nuts:	
9/16 in. and smaller, U. S. S.	75, 10 and 5 per cent off list
1/2 in. and larger, U. S. S.	70, 10 and 2 1/2 per cent off list
Small sizes, S. A. E.	80 and 5 per cent off list
S. A. E., 1/2 in. and larger	75 and 5 per cent off list
Stove bolts in packages	80 and 5 per cent off list
Stove bolts in bulk	80, 5 and 2 1/2 per cent off list
Tire bolts	50, 10 and 10 per cent off list

Cap and Set Screws	
Milled square and hex. head cap screws	75 per cent off list
Milled set screws	75 per cent off list
Upset cap screws	75 and 10 per cent off list
Upset set screws	80 per cent off list

Rivets	
Large structural and ship rivets, base, per 100 lb.	\$3.00
Large boiler rivets, base, per 100 lb.	3.10
Small rivets	.65 and 10 to 65 and 5 per cent off list

Track Equipment	
Spikes, 9/16 in. and larger, base, per 100 lb.	\$2.75
Spikes, 1/2 in. and smaller, base, per 100 lb.	3.50
Spikes, boat and barge, base, per 100 lb.	3.50
Track bolts, base, per 100 lb.	\$3.75 to 4.50
Tie plates, per 100 lb.	2.35
Angle bars, base, per 100 lb.	2.75

Welded Pipe	
Butt Weld	
Inches	Steel
1/2	49
3/4	55
1	60
1 1/4	64
1 1/2	66
Inches	Iron
1/2	23 1/2
3/4	29 1/2
1	46 1/2
1 1/4	52 1/2
1 1/2	54 1/2

Lap Weld	
2	59
2 1/2 to 6	63
7 to 8	60
9 to 12	59

Butt Weld, extra strong, plain ends	
1/2	45
3/4 to 1 1/2	51
1 1/2 to 2	57
2 to 3	62
3 to 4	64
4 to 5	65

Lap Weld, extra strong, plain ends	
2	57
2 1/2 to 4	61
4 1/2 to 6	60
7 to 8	56
9 to 12	50

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes	
Lap Welded Steel	Charcoal Iron
1 1/4 in.	21 1/2
2 to 2 1/4 in.	36
2 1/4 to 3 in.	47
3 to 13 in.	52

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes
Discounts on cold-drawn tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	55
1 1/4 and 1 1/2 in.	47
1 1/2 in.	31
2 and 2 1/4 in.	34

Hot Rolled	
3 in.	44
3 1/4 to 4 in.	49

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing	
Carbon under 0.30, base	85 per cent off list
Carbon 0.30 to 0.40, base	83 per cent off list
Plus usual differentials and extras for cutting.	

Seamless Locomotive and Superheater Tubes	
Cents per Ft.	Cents per Ft.
2-in. O.D. 12 gage	14
2-in. O.D. 11 gage	15
2-in. O.D. 10 gage	16
2 1/4-in. O.D. 12 gage	16
2 1/4-in. O.D. 11 gage	17

Tin Plate	
Standard cokes, per base box	\$4.75

Terne Plate	
(Per package, 200-lb.)	
8-lb. coating	\$9.30
8-lb. coating I. C.	9.60
15-lb. coating I. C.	11.80
20-lb. coating I. C.	13.30

Sheets	
Blue Annealed	
Nos. 9 and 10 (base), per lb.	2.50c.
Box Annealed, One Pass Cold Rolled	
No. 28 (base), per lb.	3.35c.
Regular auto body sheets, base (22 gage), per lb.	4.70c. to 5.00c.

Galvanized	
No. 28 (base), per lb.	4.35c.

Tin-Mill Black Plate	
No. 28 (base), per lb.	3.35c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	\$0.325	Buffalo	\$0.265	St. Louis	\$0.43	Pacific Coast	\$1.50
Philadelphia, export	0.235	Cleveland	0.215	Kansas City	0.735	Pac. Coast, ship plates	1.20
Baltimore, domestic	0.315	Cleveland, Youngstown	0.19	Kansas City (pipe)	0.705	Birmingham	0.69
Baltimore, export	0.225	Comb.	0.295	St. Paul	0.595	Memphis	0.385
New York, domestic	0.34	Detroit	0.295	Omaha	0.735	Jacksonville, all rail	0.50
New York, export	0.255	Cincinnati	0.295	Omaha (pipe)	0.705	Jacksonville, rail and water	0.415
Boston, domestic	0.365	Indianapolis	0.31	Denver	1.275	New Orleans	0.515
Boston, export	0.255	Chicago	0.34	Denver (pipe)	1.215		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 45,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates, 50c.; rods, wire rope cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe, not over 8 in. in diameter, 50c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

RAILROAD EQUIPMENT BUYING

Purchases of 4200 Cars and 131 Locomotives and Fresh Car Inquiries Totalling Over 10,000

The Chicago, Milwaukee & St. Paul has placed 1000 gondola cars each with the Western Steel Car & Foundry Co. and the Pullman Co. These are in addition to the 5500 cars ordered by the road last week, making a total of 7500 to be built. This company has also placed 25 Mikado type locomotives with the Baldwin Locomotive Works in addition to the 50 recently ordered from the same builder.

The Northern Pacific has placed 1000 box cars with the General American Car Co. in addition to the 2000 ordered last week.

The 1000 box cars placed by the Pere Marquette with the Western Steel Car & Foundry Co., as announced last week, have been transferred for construction to the shops of the Pressed Steel Car Co. of which the Western company is a subsidiary.

The St. Louis Southwestern has ordered 500 steel under-frame box cars from the Mt. Vernon Car Mfg. Co. and 200 ballast cars and 500 automobile cars from the American Car & Foundry Co.

The Texas & Pacific is inquiring for 1000 gondola cars, 800 box cars and 200 automobile cars.

The Great Northern is considering the purchase of 1000 ore cars of 75 tons capacity.

The Steamship Fuel Corporation is in the market for 100 hopper cars.

The Southern Pacific is inquiring for 3700 box, 650 flat, 550 stock and 100 caboose cars.

The Northern Pacific has placed 20 Pacific type, 25 Mikado type and four Mallet type locomotives with the American Locomotive Co.

The Delaware, Lackawanna & Western has awarded 5 Pacific type locomotives to the American Locomotive Co.

The Canadian National Railways are inquiring for 56

locomotives, 95 passenger service cars and 50 express refrigerator cars and 50 caboose cars and 1250 stock cars.

The Illinois Central contemplates entering the market for additional freight cars after the first of the year.

Sales by the American Locomotive Co. include the following: Lehigh-Portland Cement Co., Allentown, Pa., 1 four-wheel switching type (79,000 lb.); Inspectoria Federal Das Estradas, for the E. F. Central Do Piahy, Brazil, 1 six-wheel switching type (70,000 lb.) and one consolidation type (90,000 lb.); Richmond, Fredericksburg & Potomac Railroad Co., Richmond, Va., 1 eight-wheel switching type (230,000 lb.) and 1 six-wheel switching type (172,000 lb.); Riverside-Portland Cement Co., Riverside, Cal., 1 six-wheel switching type (128,000 lb.); Georgia Northern Railway Co., Moultrie, Ga., 1 ten-wheel locomotive (143,000 lb.); Essex Terminal Railway Co., Walkersville, Ont., 1 six-wheel switching type (145,000 lb.); Detroit Terminal Railroad Co., Detroit, Mich., 2 eight-wheel switching type (240,000 lb.); Warren Foundry & Pipe Co., Phillipsburg, N. J., 1 four-wheel switching type (99,000 lb.); Union Oil Co., Oleum, Cal., a switching engine.

Minneapolis, St. Paul & Sault Ste. Marie Railway Co. has ordered 5 Pacific type (269,000 lb.) locomotives of the American Locomotive Co.

The Central Railroad of New Jersey has ordered 10 eight-wheel switching type (240,000 lb.) locomotives of the American Locomotive Co.

The Union Pacific System has bought a 12-in. rotary snow plow of the American Locomotive Co.

The Denver and Rio Grande Western Railroad System has closed with the American Locomotive Co. for 10 mountain type (377,000 lb.), 10 Mallet type (531,000 lb.) and 5 Mallet type (230,000 lb.) locomotives.

The Maine Central has ordered 8 locomotives of the Lima Locomotive Co.

The Pennsylvania Equipment Co., Norwood, Pa., is in the market for 10 used vestibuled passenger coaches, besides two baggage cars.

The Grand Trunk has issued inquiries for 40 locomotives.

The Pere Marquette is in the market for 40 locomotives.

FABRICATED STEEL BUSINESS

Awards of About 20,000 Tons and New Inquiries for 22,000 Tons

Addition to Roslyn Hotel annex, Los Angeles, 1258 tons, to Llewellyn Iron Works.

Building for Castle & Cooke, Ltd., Honolulu, Hawaii, 200 tons, to Worden-Allen Co.

Santa Fe Lines, addition to ice plant, Bakersfield, Cal., 176 tons, to unidentified fabricator.

Plates for Maliko siphon, Wailoa ditch, Maui, Hawaii, 128 tons, placed locally.

Buildings for Richmond, Fredericksburg & Potomac Railroad, Richmond, Va., 350 tons, to McClintic-Marshall Co.

Missouri Pacific, turntables, 210 tons, to unnamed fabricator.

Department store addition for H. C. Prange Co., Sheboygan, Wis., 400 tons, to Worden-Allen Co.

Car repair shop for Lake Superior & Ishpeming Railroad at Marquette, Mich., 200 tons, to Wisconsin Bridge & Iron Co.

Fourth National Bank building, Boston, 2000 tons, to New England Structural Co., Boston.

Sacking plant and grain storage building for Board of Commissioners, New Orleans, 260 tons, to St. Louis Structural Steel Co.

Seventh District sheds for Board of Commissioners, New Orleans, 450 tons, to St. Louis Structural Steel Co.

Horses and props, Dam 32, Ohio River, 225 tons, to American Bridge Co.

Jewish Temple, Cleveland, 900 tons, to the National Iron & Wire Co.

Henry Longfellow School, Toledo, 100 tons, to the American Bridge Co.

Towers for Delaware River Bridge connecting Philadelphia and Camden, 9500 to 10,000 tons, largely plates, to Bethlehem Steel Bridge Corporation.

Texas Co., 10 tanks of 64,000 bbl. capacity each, 2200 tons of steel, to Phoenix Iron Works Co., Meadville, Pa.

Store and loft building for Revillon Frères, West Thirty-fourth Street, near Fifth Avenue, New York, 1000 tons, to Hay Foundry & Iron Works.

Apartment building at Park Avenue and Eighty-seventh Street, New York, 900 tons, to Paterson Bridge Co.

Coal bunker for East Penn Electric Co., Pine Grove, Pa., 200 tons, to Bethlehem Steel Bridge Corporation.

Power house for State of New York at Vischer's Ferry, N. Y., 250 tons, to Bethlehem Steel Bridge Corporation.

Apartment building at Lexington Avenue and Sixty-ninth Street, New York, 220 tons, to Hedden Iron Construction Co.

Structural Projects Pending

Inquiries for structural steel work now being figured on include the following:

National Screw & Tack Co., crane runway and trestle, 200 tons.

Niagara Falls, Lockport & Ontario Power Co., Niagara Falls, transmission towers, 4000 tons, bids taken.

Chicago Union Station Co., Roosevelt Road viaduct, 3000 tons, bids in Dec. 6.

Chicago Tribune Building, Chicago, about 5000 tons, plans not completed.

American Radiator Co., St. Paul, Minn., 500 tons, bids taken Dec. 4.

LaSalle Street sub-station, Commonwealth Edison Co., Chicago, 300 tons.

Harsh & Chapline Co., shoe factory addition, Milwaukee, 200 tons, Hackendahl & Schmidt, low bidders.

Chicago, Burlington & Quincy, beams and deck plate girder spans, 150 tons.

Northern Pacific, girders and plates, 113 tons.

Municipal Police Station, Boston, 700 tons.

Sand Springs, Okla., cotton mill, 372 tons, Southwest Engineering Co., Tulsa, engineer.

Plant for Mengel Body Co., Louisville, Ky., 450 tons, bids in.

School at Williamsburg, Ohio, 100 tons.

Two steel dump scows, U. S. Engineers Office, Portland, Ore., about 100 tons, bids close Dec. 26.

Apartment building at Broadway and Eighty-second Street, New York, 900 tons.

Apartment building at Fifth Avenue and Ninety-fifth Street, New York, 500 tons.

Addition to West Side Y. M. C. A. building, Fifty-seventh Street, New York, 1500 to 2000 tons.

Knickerbocker warehouse at Amsterdam Avenue and Sixty-ninth Street, New York, 1000 tons.

Baltimore & Ohio, bridge work, 1400 tons.

New York Central Lines, bridge repairs, 500 tons.

New York Municipal Railway Corporation, extension to platform at Canal Street, 200 tons.

Northeast Junior High School, Baltimore, 400 tons.

Independent Fruit Auction Corporation building, New York, 200 tons.

GERMAN PRICES SKY-ROCKET

Pig Iron Advances 45 Per Cent—Steel Only 10 to 13 Per Cent

(By Radiogram)

BERLIN, GERMANY, Dec. 5.—Foundry iron No. 1 has advanced to 156,665 m. per metric ton (\$19.89 per gross ton, at 1¼c. per 100 m.); steel ingots are now quoted at 177,800 m. (\$22.58); steel bars, at 243,300 m. (1.38c. per lb.); thin plates or sheets, at 373,600 m. (2.12c. per lb.)

[Foundry iron No. 1 was 107,765 m. (14.37) last week. On Nov. 20 ingots were quoted at 161,600 m. (\$26.68); bars, at 219,200 m. (1.62c. per lb.); thin sheets, at 332,000 m. (2.45c. per lb.) These mark prices for steel remained unchanged Nov. 27. In each case the American price equivalent was figured at the exchange rate momentarily prevailing.]

Standardization Proceeding—Russia Introduces Metric System—Otto Wolff and A. E. G. Negotiate Merger

BERLIN, GERMANY, Nov. 17.—The upward movement of German prices has not yet halted, and wages are being generally raised. One of the most important wage changes is in the coal industry, where miners wages have been increased by 55 per cent, and allowing for the heavy increases in cost of production, as well as for the doubling of the tax on building miners' dwellings, the federal coal council has just raised prices on the average by 72 per cent. Although they have now reached a value about a thousand times that of 1913, even now the German prices are only about 40 per cent of the cost of imported coal, but the significance of the increase lies in the fact that it causes all other prices to rise again heavily.

The immediate effect of the increase in coal is the rise in iron and steel. In the case of bar iron for instance this amounts to about 66 per cent since Nov. 1, and to about 170 per cent since Oct. 18. Compared with November, 1921, bar iron is now about 48 times higher. The following table shows the present guiding prices for basic material in marks per metric ton, at works:

Ingot	161,600	Hoop iron	258,700
Blooms	178,000	Wire rods	235,000
Billets	188,700	*Sheets	
Sheet bars	193,200	No. 6 and lower..	247,300
Structural shapes...	216,700	Nos. 6 to 11.....	278,800
Bar iron	219,200	Nos. 11 to 20.....	311,900
Universal iron.....	237,900	No. 20 and lighter	332,000

*United States gage.

Prices of some items are higher than those prevailing abroad, and should the mark retain its present exchange value, German iron and steel manufacturers may find it almost impossible to compete. Most works, however, have sufficient orders to tide them over the winter. Considerable orders for rolled material, machinery, and hardware have lately been booked from neighboring countries in the East. South America and Scandinavia are also buying more freely. Scrap prices have increased greatly not only because of the depreciation of the mark, but also through higher foreign prices. Working more hours at ordinary pay or with only a small extra, is strongly urged by employers, on the ground that an increase in German production would improve the position of the country. Labor, however, is averse to a compromise on this point.

Agreement with Poland Under Negotiation

Since Germany raised the embargo on exports to Poland some time ago in exchange for facilities given by Poland in the transit of Russo-German commerce, Poland has bought a considerable amount of German goods especially of a technical nature. Negotiations being conducted at Dresden touch some of the most vital questions between Poland and Germany. The Government has introduced in the Reichstag a draft for the settlement of the difference between Germany and

Poland caused by the partitioning of the mines and other industrial works in Upper Silesia.

Progress in Standardization

The movement to standardize industrial products has received much attention in Germany during the past few years under the leadership of the Society of Constructional Engineers. Most of the work has been done in engineering standardization but the interdependence of standards in other lines has led to the formation of a new body, the Standard Committee of German Industry, (Normenausschuss der Deutschen Industrie) which combines different interests. The standards worked out and introduced comprise all lines of engineering, building material, sizes of papers, etc., and a great number of others are under consideration. It will be years before these standards are generally introduced in Germany, but the smaller European countries show great interest in the German standards and may adopt some of them. As Russia is introducing the metric system, German standards may also influence development there. From January, 1923, the system will be used in the foreign trade commissariat, in the postal service and in the commissariat of health. Until 1927 it is to be introduced for sole use in all the other commissariats in the commerce and industry of the whole country.

Wolff and A. E. G. Negotiate Merger

The fusion of the Sachsenwerk electrical works with the Otto Wolff company not having materialized, the Wolff interests are now establishing association with the Allgemeiner Elektrizitäts Gesellschaft. The association of these two great concerns, Otto Wolff with the large steel works of Phoenix, Rheinstahl, van der Zypen and its extensive trading and export organization, and the A. E. G., creates a powerful organization to influence the further development of the German engineering and electrical industries considerably.

Polish Steel Industry Active

The Polish iron industry is developing. The number of workmen increased from 5380 in 1919 to 17,800 in 1922. The table shows the development in production during the same time:

	Blast Furnaces		Open-Hearth Furnaces		Rolling Mills	
	Number in Blast	Production, Metric Tons	Number Operating	Production, Metric Tons	Number Operating	Production, Metric Tons
1919.....	2	15,200	3	16,180	4	14,360
1920.....	5	42,610	7	68,107	8	48,970
1921.....	7	60,443	15	118,033	10	92,054
1922,						
1st half	7	39,400	11	67,100	10	57,800

Date of Freight Rate Extended

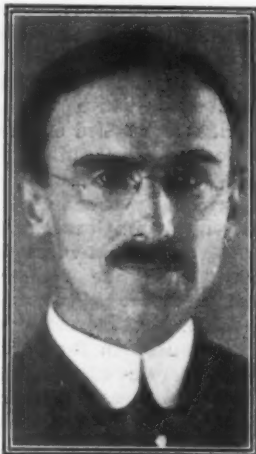
WASHINGTON, Dec. 5.—Modifying its recent order requiring cancellation of schedules proposing a proportional rate of 20c. per 100 lb. on iron and steel products from New Orleans rate points to Houston, Texas, rate points, the Interstate Commerce Commission to-day entered an order postponing the effective date to Feb. 15, 1923, instead of Dec. 11.

Erection of a 500-ton blast furnace for the Sharpsville Furnace Co., Sharpsville, Pa., has been started by the William B. Pollock Co., Youngstown. Fabrication of plate work for the stack has been in progress at the Pollock company's plant for some time. Included in the new installation are a pig casting machine and ladles. It is expected the furnace will be ready for pouring in about four months.

The spring convention of the Society of Industrial Engineers will be held in Cincinnati, April 18, 19 and 20, the major subject being "Management Problems of the Smaller Plants." All the papers to be presented will deal with plants of 500 employees and less.

PERSONAL

L. M. Waite, sales manager of Garvin Machine Co., New York, for the past year and a half, was elected general manager of the company on Dec. 1. He entered the service of the Cleveland Automatic Machine Co. as office boy and worked his way up until he became a salesman. He then joined the National Acme Co. at the time of its formation and occupied positions of various capacities in the shop and sales work, leaving the company after having been a sales manager for many years. During the next eight years he was identified with the machine tool industry in New England, both in the manufacturing and sales capacities.



L. M. WAITE

A. R. Hussey, for the past eight years associated with the Brown & Zortman Machinery Co., Pittsburgh, has severed that connection and joined the sales force of the Pittsburgh office of Manning, Maxwell & Moore, Inc. Mr. Hussey's first affiliation with the machine tool business was with the Baird Machinery Co., Pittsburgh, in 1903.

J. W. Dowling, Bessemer Building, Pittsburgh, has been appointed sales agent of the Big Savage Fire Brick Co., Frostburg, Md., succeeding Walter H. Kelley, who resigned to become refractories engineer of the Bethlehem Steel Corporation, with headquarters at Bethlehem, Pa. Mr. Dowling will continue to represent in a sales capacity the Superior Silica Brick Co., Port Matilda, Pa., and the Kentucky Fluorspar Co., Marion, Ky.

E. C. Woolgar, sales manager of the machinery department, National Acme Co., Cleveland, who has been confined in a hospital for several weeks, during a portion of the time being critically ill, has undergone a marked improvement during the last few days and is regarded as well on the road to recovery.

Charles M. Wambaugh was elected president of the Columbus-McKinnon Chain Co. at the adjourned annual meeting held recently. Julius F. Stone and Charles J. Carter were elected vice-presidents, A. F. Markel, treasurer, and J. C. Dunn, secretary.

James E. Sague, formerly vice-president in charge of manufacturing and engineering, Worthington Pump & Machinery Corporation, has been appointed chief consulting engineer of the corporation. Frank H. Jones, formerly vice-president in charge of sales, has been appointed consultant in matters pertaining to sales. William Goodman has been appointed vice-president to take Mr. Sague's place in charge of manufacturing and engineering, and E. T. Fishwick has been appointed vice-president in charge of sales.

T. B. Reid, well known in machine tool circles both in Canada and in the United States, has been appointed vice-president and sales manager for the Joliette Steel Products, Ltd., Joliette, Que., with offices in Toronto. He was formerly secretary-treasurer and manager for the A. R. Williams Machinery & Supply Co., Buffalo and Detroit, having his headquarters in Buffalo. For several years he has been connected with the Canadian General Electric Co. and the Russell Motor Co.

Wilbur S. Sample, formerly manager of the Montreal office of the George A. Fuller Co., Ltd., has recently left for Dairen, Manchuria (North China) to assume

the duties of district manager of the George A. Fuller Co. of the Orient, Ltd., in Chinese territory. He will direct the construction of a general hospital for the South Manchurian Railway Co. at Dairen, together with additional construction work which is to follow both in that section and Shanghai, China.

A. E. Jones, sales engineer in the New York office of the Terry Steam Turbine Co., has accepted a position in a similar capacity with W. B. Connor, Inc., 90 West Street, New York, effective Jan. 1.

C. C. Sundmacher, for 15 years connected with Pickands, Brown & Co., Chicago, has become identified with the United Coke & Coal Co., Fisher Building, Chicago, as sales representative.

Andrew C. Scherer has been appointed by Robert W. Hunt & Co. as assistant to C. W. Gennet, Jr., in the supervision of its rail and track appliances department. Mr. Scherer was graduated from the University of Wisconsin in 1909, and immediately thereafter entered the employ of the Hunt company. Since that time he has been its chief inspector at the Monterey (Mexico) Steel Works, and following the closing of that establishment was transferred as chief inspector to the Lackawanna Steel Co. plant, in which position he remained until entering the Ordnance Department of the United States Army as lieutenant. Upon returning to civil life at the close of the war, he resumed his connection with Robert W. Hunt & Co., having charge of its physical laboratory in Chicago until the recent appointment.

B. M. Gruterling, Antwerp, Belgium, representing Belgian blast furnace interests, has arrived in the United States and is at the Hotel Plaza, New York.

T. W. Siemon, vice-president in charge of the drop forge division, Union Switch & Signal Co., 1817 Brad-dock Avenue, Swissvale, Pa., has severed his connection with the company. Finley L. Walton has been appointed to succeed him.

OBITUARY

FRANCIS WOOD CARPENTER, president Congdon & Carpenter Co., Providence, R. I., died on Friday evening, Dec. 1, at his home in that city following a protracted illness. Mr. Carpenter was born in Seekonk, R. I., June 24, 1831, the son of Edmund and Lemira Tiffany Carpenter. After his graduation from the academy of that town, he entered the employ of Gilbert Congdon as an apprentice, and after learning the various branches of the business was taken into partnership, the firm becoming G. Congdon & Co. In 1892 the firm was incorporated under its present name, and Mr. Carpenter became president. For many years he was president of the Rhode Island Perkins' Horse Shoe Co., and president of the American National Bank.

JAMES J. MCCARTHY, who has been prominently identified with the railway supply business for many years, died Nov. 25 at his home, 4800 Kimbark Avenue, Chicago. Mr. McCarthy was one of the original organizers of the Independent Pneumatic Tool Co., and served as a director up to the time of his death. He also organized the Chicago-Cleveland Car Roofing Co., and took an active part in its business. Mr. McCarthy was past his 80th year, and died of pneumonia.

WILLIAM M. BYERS, for more than half a century actively associated with the financial and industrial life of Gananoque, Ont., died suddenly at the residence of his brother-in-law, B. W. Heaslip, with whom he resided. He was largely interested in the Ontario Steel Products Co., Ltd.; the Gananoque Spring & Axle Co., the Ontario Wheel Co., and other industrial as well as a number of financial interests.

F. B. McNAB, 37, business manager of the General Motors Research Laboratories Corporation, Dayton, Ohio, died at his residence in that city on Nov. 13.

NEW TRADE PUBLICATIONS

By-Product Coke & Gas Plant.—Semet-Solvay Co., Syracuse, N. Y. In a 44-page booklet, 8 x 11 in., have been placed a large number of illustrations and a considerable amount of data covering the by-product coke oven work of the company issuing the publication. There are diagrams showing methods of operation as well as photographs showing both details and general views of the plants. A map is given indicating the location of the principal units installed by this company.

Sturtevant Unit Heater.—B. F. Sturtevant Co., Hyde Park, Mass. Bulletin No. 296 of 16 pages, 8 x 11 in., is devoted to an individual forced blast heater unit for shop use. This is shown to be a development of a system originally introduced by the company in 1870, and part of the bulletin is taken up with the historic development of the heater. Both photographs and diagrams are used as illustrations and tables are given of different sizes and capacities of units.

Pneumatic Collecting and Conveying Systems.—B. F. Sturtevant Co., Hyde Park, Mass. Catalog No. 291 has 72 pages, 8 x 11 in., filled with illustrations and data covering the subject matter above. There are numerous tables of sizes and capacities, together with discussions of both the tables and designs of apparatus. The work is frankly fragmentary because of the innumerable details which would have to be covered to make it complete for each of the many industries served.

Degeneration of Water.—H. S. B. W.-Cochrane Corporation, formerly the Harrison Safety Boiler Works, Philadelphia. Booklet describing the apparatus designed to deliver water free of dissolved oxygen at any temperature from 140 deg. upward, as required, for hot-water heating and service systems and for feeding to economizers and boilers, all as a measure of preventing corrosion to piping, boilers and other apparatus.

Brass and Copper Price List.—American Brass Co., Waterbury, Conn. Revised sheets for insertion in American Brass Co.'s loose-leaf price book, covering brass, bronze and nickel silver sheets and strips, copper in rolls, and various wire and rod prices, etc.

Copper Shingles.—Edwards Mfg. Co., Cincinnati. Artistically illustrated brochure devoted to shingles and Spanish tile made in copper, showing various forms of copper shingles, together with views of houses and buildings on which the material has been used.

Radio Apparatus.—Ludwig Hommel & Co., 530 Fernando Street, Pittsburgh. Encyclopedia of radio apparatus, listing and illustrating virtually all items with a view to convenience in ordering. It includes a bibliography of texts on various phases of radio construction and operation.

Calendar.—Link Belt Co., 910 South Michigan Avenue, Chicago. 1923 Link Belt calendar, ready for distribution in December, 13½ x 24 in., containing 12 separate full sheets, each with an illustration of Link-Belt machinery and equipment.

Chase Condenser Tubes.—Chase Metal Works, Waterbury, Conn. In a 32-page pamphlet is described the manufacture of tubes for condensers, from the mixture of the metals to the final test of the tubes after manufacture. The story is well illustrated and covers not only the details of the manufacturing process, but discussion of the grain size and of various methods of testing and examination of the tubes after they have been made. The pamphlet carries the thesis that a sound condenser tube, irrespective of its casting or early stages of manufacture, can be made to comply with any reasonable specification by the annealing and drawing operations.

Die Heads.—Geometric Tool Co., New Haven, Conn. Booklet of 11 pages describing the company's style DS screw-cutting die heads, which are self-opening and adjustable for Brown & Sharpe, and particularly adaptable to other single spindle automatics. Features of construction are outlined and instructions for operating are given. Specifications and list of parts are included.

Tapping Devices and Appliances.—Geometric Tool Co., New Haven, Conn. Booklet 4 by 7½-in., 29 pages, describing and illustrating the Jarvis high-speed tapping device, with instructions for operating and a list of parts. The Jarvis friction tapping device, style FD; the Jarvis quick-change chucks and collets, style P, for drilling, counterboring, tapping and chuck setting, and the Jarvis combination tapping device and quick-change

chucks, style S and style R, are illustrated and described. A section on the construction and operation of the Jarvis self-opening stud setter is included.

Material Handling Equipment.—Herbert Morris, Inc., 30 Church Street, New York. Two bulletins illustrating and describing the Morris triple-gear chain block and hand-power cranes. Specifications on all sizes of this company's chain blocks from ¼-ton to 10-ton capacity are given, as well as line drawings of the construction.

Air Hoists.—Sullivan Machinery Co., Chicago, Ill. Bulletin 76-B describes the company's double-drum, portable air hoist known as "turbinair," for use in hauling ore-scrappers or "slushers." The two drums of this hoist are controlled independently by friction clutches and band brakes, corresponding in operation to those used on the single drum hoist. By this method either drum may be operated separately, or both may be thrown into gear at the same time.

Centrifugal Pumps.—Dayton-Dowd Co., Quincy, Ill. Bulletin 249, superseding 244, size 7½ x 10½, 32 pages. Covers the company's type CS single stage, double-action pump. The design and specification of the pumps are given in the first section, the illustrations including cross-sectional views, characteristic curves, a table of dimensions, and a speed capacity table with approximate efficiencies. Section two describes and illustrates the method of testing. The various types of drive, motor, turbine and belt, are described and illustrated in a third section, which is followed by a section with illustrations of various installations. A section devoted to hydraulic data includes correct and incorrect methods of installing suction lines.

Steam Turbines.—Standard Turbine Corporation, Wellsville, N. Y. Bulletin 6, size 8½ x 11 in., 8 pages. Describes type 228 standard steam turbine, which is of the velocity stage type, with two revolving rows of buckets in each stage and built in one or two stages, as the condition may require. Various details of construction such as the casing, bearings, buckets and nozzles and other details are given, the illustrations being of the pump unit and the generator unit. Sectional views showing the interior construction are included.

Gear Design.—R. D. Nuttall Co., McCandless and Harrison Avenues, Pittsburgh. Booklet No. 36, containing a series of charts on gear design, and bulletin No. 34, a new publication entitled, "Industrial Helical Gears."

Horizontal, Boring, Drilling and Milling Machines.—Niles-Bement-Pond Co., 111 Broadway, New York, circular No. 285, size 9 by 11 in., 12 pages. Describes and illustrates its duplex control borer, driller and miller. The illustrations include large detail views of various parts of the machine, a double page being given to illustration of an operator manipulating the various controls. Different drive arrangements are illustrated, and also tables and other attachments. Specifications are given for the 60 and 72 in. machines.

Duraloy.—Cutler Steel Co., Pittsburgh. Bulletin No. 221, 4 pages, devoted to the development, physical properties, composition and characteristics, strength and high temperatures, machining and welding qualities, oxidation and heat resistance, resistance to corrosion, and abrasion of Duraloy, a chromium iron alloy.

Rust Proofing.—Udelyte Process Co., Kokomo, Ind. Booklet describes the company's rustproofing process involving the use of the metal cadmium, which is deposited electrochemically.

Bearing Metals.—Cadman Mfg. Co., Pittsburgh. Engineering bulletins, No. 1 and No. 2, discuss this company's 60 years' experience in making bearing metals.

Locomotive Repairs.—Metal & Thermit Corporation, New York. Fourth edition of pamphlet No. 21 contains many revisions and additions on the application of thermit to locomotive and railroad equipment repairs.

Metropolitan Subway and Elevated Systems.—In a splendidly handled pamphlet of 28 pages, 8 x 10½ in., the General Electric Co., Schenectady, N. Y., has issued as bulletin No. 44018 a description in brief of the systems of the Boston Elevated Railroad, Brooklyn Rapid Transit, Chicago Elevated Railroads, Hudson and Manhattan Railroad, Interborough Rapid Transit and Philadelphia Rapid Transit Co. Each of these is illustrated not only by half-tones, but with an outline map of the district covered, showing the extent of the lines, both elevated and subway. Attention, of course, is concentrated upon the electric features of the equipment as furnished by the issuing company, but enough is given of the characteristics of the systems to make it decidedly readable.

Machinery Markets and News of the Works

MORE RAILROAD BUYING

Chicago, Burlington & Quincy and Pennsylvania Place Large Orders

Missouri Pacific in the Market at St. Louis for List of 53 Machines

The Chicago, Burlington & Quincy Railroad and the Pennsylvania Lines East have enlivened the machine-tool markets during the past week by the placing of large orders for shop equipment. The Burlington will probably conclude its purchases this week and the total will be close to \$500,000, according to Chicago reports. The Pennsylvania Railroad had about 80 items on its list and orders for practically all of these machines have been placed either formally or informally.

Another large railroad inquiry has come out at St. Louis, the Missouri Pacific asking prices on 53 items, principally engine lathes, turret lathes, planers, shapers, drilling machines and milling machines. The inquiry of the Chicago, Milwaukee & St. Paul is still

pending at Chicago. The New York Central has purchased a few machines; the Southern Pacific has ordered a 90-in. quartering machine and a few smaller tools, and other railroad business has been received, mostly in the form of orders for single tools.

Railroad equipment companies are buyers. The American Locomotive Co. is in the market for several machines and the American Car & Foundry Co. has inquired for three or four tools. The Canton Car Co., Canton, Ohio, will enlarge its facilities for repair work and will probably buy cranes and tools.

Inquiries from general industrial sources are numerous, but the percentage of orders is small. A Pittsburgh dealer has compiled figures showing that it has quoted on about 2000 inquiries in 11 months of this year, the total value being \$1,500,000 to \$2,000,000. Only a small part of this business has been closed, which leads to the belief that much of it will come up again in 1923.

The Ford Motor Co. is inquiring for tools for its assembling plant at Green Island, N. Y. The Chicago, Wilmington & Franklin Coal Co. has bought 8 or 10 tools for its mine at West Frankfort, Ill.

New York

NEW YORK, Dec. 5.

THE most important buying of machine tools in the East is that by the Pennsylvania Railroad for its new shops at Altoona, Pa. Orders are being placed at the purchasing office in Philadelphia. A good share of the 80 tools on its list has been formally or informally ordered. Most of the current business of importance continues to come directly or indirectly from the railroads. The American Locomotive Co., New York, has inquiries out for several machines, including four boring mills, and is expected to issue further inquiries shortly. The American Car & Foundry Co., New York, is in the market for a few tools. The Southern Pacific has bought a 90-in. quartering machine and a few smaller tools for Western shops. The Sprague Electric Works of the General Electric Co., of Bloomfield, N. J., is in the market for three turret lathes. Other shops of the General Electric Co. continue to send out inquiries. Two milling machines have been purchased for the Erie works.

November business with some sellers was the best of the year. This is particularly true with dealers who handle both new and used tools. Recent advances in prices of new machines are causing buyers to look over carefully all available used machines, and in many instances the latter are bought because of considerable saving in price.

No new crane inquiries of any size have appeared the past week, but there are several for cranes of fairly large capacities which are pending. Some inquiries have appeared for estimating purposes in arranging appropriations for next year, and one or two have been withdrawn from the market. Among these are the American Car & Foundry Co., which recently has been accepting bids on a 10-ton overhead crane and the Cutler Steel Co., Pittsburgh, Pa., which has also postponed purchase of a 10-ton electric crane. Among current inquiries, about the largest is from the American Locomotive Co., for an installation at

its Schenectady plant. The inquiry calls for two 150-ton double trolley, 75-ft. span cranes for handling locomotives and two 20-ton, 71-ft. span, also double trolley cranes. The recent inquiry of the Adirondack Light & Power Co., Amsterdam, N. Y., for a 30-ton electric crane will probably be closed this week. The Kansas City Bolt & Nut Co., Kansas City, Mo., is stated to be in the market for a 47-ft. span ladle crane.

Among recent purchases are:

American Locomotive Co., a 20-ton locomotive crane for use at its Brooks plant, Dunkirk, N. Y., from the Ohio Locomotive Crane Co.

Pickands, Mather & Co., Cleveland, two 40-ton, 50-ft. boom locomotive cranes for use in Minnesota, from the Industrial Works.

Gould & Taylor Cut Stone Co., Brooklyn, N. Y., a 71-ton, 65-ft. span, 3-motor overhead traveling crane, from the Bedford Foundry & Machine Co.

Edward G. Budd Mfg. Co., Philadelphia, a 5-ton, 17-ft. span, 3-motor overhead traveling crane, from the Niles-Bement-Pond Co.

Philip T. King, 30 Church Street, New York, dealer, has purchased four 50-ton unused industrial wrecking cranes from the Navy Department, Great Lakes, Ill.

David J. Joseph Co., Cincinnati, iron and steel scrap, three 3C and one 8C locomotive cranes for its Youngstown and Cincinnati yards, from the Browning Co.

The Arctic Hygeia Ice Mfg. Co., 300-60 East 133d Street, New York, has plans for extensions and improvements to cost \$150,000, including additional equipment. Ophuls & Hill, 112 West Forty-second Street, are engineers. George Kinkel is president.

The Electric Cord Adjuster Corporation, 103 East 125th Street, New York, recently organized to manufacture electrical specialties, is making inquiries for black steel-spring wire, tubing and kindred products. A. F. Brown is manager.

The Bureau of Yards and Docks, Navy Department, Washington, will take bids until Dec. 28 for refrigerating machinery for the ice plant at the proposed veterans' hospital at Tupper Lake, N. Y., as set forth in specification 4720; also for one steel water tank, specification 4724.

The Board of Trustees, Floral Park, N. Y., will install an electrically operated pumping plant in connection with

waterworks extensions. C. E. Marshall, Hempstead, N. Y., is engineer.

Carnival Place, Inc., 2 Columbus Avenue, New York, has plans for a one-story automobile service and machine repair works, 139 x 350 ft., at Nagle and Academy Avenues, to cost \$125,000. Frederick Heister, 534 West Fifty-sixth Street, is architect. James E. Butterfield is president.

The Ice Service Co., 68 Ninth Avenue, New York, operating five local ice-manufacturing plants, is disposing of a bond issue of \$3,000,000, a portion of the proceeds to be used for extensions and improvements.

The Elmhurst Ice Co., Renn Place, Elmhurst, L. I., is taking bids for the erection of a two-story ice-manufacturing plant, 40 x 119 ft., on Junction Avenue, Corona, N. Y., estimated to cost \$150,000, including machinery. William Vanfelde, 2188 Metropolitan Avenue, Middle Village, N. Y., is architect.

The Metropolitan Mechanical Works, Inc., 129 Boerum Place, Brooklyn, is making inquiries for a precision bench lathe.

A two-story machine shop and mechanical department extension will be made to the works of the Borough Park Garage Co., 16 West Thirty-first Street, New York, at 3091-3111 Fourteenth Avenue, Brooklyn, to cost \$25,000.

The International Petroleum Co., 120 Broadway, New York, will build pumping plants, oil storage and distributing plants and other mechanical structures in connection with a new pipe line system in the South American oil fields, estimated to cost \$20,000,000. It will be used by the Leonard Oil Development Co., Colombia Syndicate, Transcontinental Oil Co., and other interests of the Standard Oil Co.

The Western Electric Co., 195 Broadway, New York, with plant at Hawthorne, Ill., is arranging for a \$15,000,000 bond sale, a portion of the proceeds to be used for extensions, improvements, etc.

The New York Central Railroad Co., 466 Lexington Avenue, New York, will receive bids until Dec. 13 for two inclined freight elevators for Pier D, North River, with fence wire, posts and parts for complete installation. C. S. White, Room 344, address noted, is purchasing agent.

The Hudson Wire Co., 62 Water Street, Ossining, N. Y., has awarded a contract to the McClintic-Marshall Co., 50 Church Street, New York, for a new one-story building, 20 x 150 ft., to cost \$25,000.

The Radio Corporation of America, Woolworth Building, New York, has tentative plans under consideration for the construction of new wireless stations in England, France, Germany and other European countries, with power plants for long-distance transmission, steel towers, etc. Edward J. Nally is president.

The Federal Meter Co., Brooklyn, recently organized, has perfected plans for the operation of a plant at 838 Fourth Avenue. John H. Atwell, formerly connected with the Thomas Meter Co., is one of the heads of the new company.

The Board of Trustees, Glens Falls, N. Y., will install an electrically operated pumping plant in connection with extensions and improvements in the sewerage system, estimated to cost \$120,000. Revised plans are to be prepared. J. Meyer, City Hall, is city engineer.

A power house will be constructed in connection with the new two-story plant, 65 x 115 ft., to be erected at Mechanicsville, N. Y., by George P. Ide & Co., Troy, N. Y., manufacturers of collars, etc., estimated to cost \$100,000. Edward T. Loth, 253 Broadway, Troy, is architect.

The Crane-Simplex Co., Inc., 115 Broadway, New York, recently organized, has acquired the property and equipment of the Simplex Automobile Co., New Brunswick, N. J., from the Mercer Motors, Inc., Trenton, N. J., and will resume the manufacture of the Simplex car in a plant at Long Island City, where a building will be equipped and placed in operation early in January. The New Brunswick plant was used for the manufacture of Hispano-Suiza airplane motors during the war, when production of the Simplex automobile was discontinued, and will not be utilized by the new organization at the present time. L. R. Ayers is president of the new company; John H. Bawden, Jr., for the past ten years associated with the Mercer organization, is vice-president and general manager; Harvey B. Clark and Frederick H. Brand, identified with the former Simplex company, are treasurer and assistant treasurer, respectively.

The M. W. Kellogg Co., Westside Avenue, Jersey City, N. J., manufacturer of pipe, steam specialties, etc., has completed plans for a new one-story foundry on Hackensack Avenue, to cost \$49,000.

A vocational department will be installed in the two-story junior high school to be erected on the Newton Lake Boulevard, Collingswood, N. J., for which plans are being completed by P. A. Davis, 1713 Sansom Street, Philadelphia, architect.

The Commonwealth Electric Co., Summit, N. J., and affiliated interests, the Lakewood & Coast Electric Co., and the Lakewood & Coast Water & Electric Co., have been acquired by the Albert Emanuel Co., 61 Broadway, New York, manager of utility properties, for \$4,000,000. The new owner will take possession at once, and plans for extensions and improvements in the plants and system. The American Waterworks & Electric Corporation, 50 Broad Street, New York, has purchased the Commonwealth Water Co., another affiliated interest, operating at New Providence, Millburn, Maplewood and vicinity, and will improve and increase the capacity of the plant.

The Irvington Cooperage Co., 63 Cordler Street, Irvington, N. J., is in the market for a 100-hp. boiler, locomotive type.

The Wiener Body Co., 252 Academy Street, Newark, manufacturer of automobile bodies, has acquired four acres on Hoffman Place, Irvington, for the erection of a new plant. Max Wiener heads the company.

The William B. Kerr Co., 144 Orange Street, Newark, manufacturing jeweler, has leased the two-story and basement factory at 263 Washington Street for a new plant and will remove to this location.

The Katchem-Shaw Iron Works, Inc., 487-95 Lyons Avenue, Irvington, has filed plans for a one-story building, 75 x 100 ft., for a structural steel and ornamental iron fabricating works. Solomon Shaw is chief engineer and one of the heads of the company.

Ovens, power equipment, conveying and other mechanical equipment will be installed in the new baking plant to be erected by Dugan Brothers, 287 Broadway, Brooklyn, at 161-75 Abington Avenue, Newark, for which plans have been filed. It will cost \$135,000 with equipment.

A manual training department will be installed in the two-story high school to be erected at Hightstown, N. J., estimated to cost \$200,000, for which plans are being prepared by Guilbert & Betelle, 346 Broad Street, Newark, architects.

The L. H. Trowbridge Sign Co., 86 Frelinghuysen Avenue, Newark, manufacturer of display signs, has leased a floor in the building at 48-50 Westfield Avenue, Elizabeth, N. J., for a branch plant.

The Magnus Electric Co., Inc., 451 Greenwich Street, New York, is enlarging its factory floor space by 11,000 sq. ft. to provide for increased output, the second enlargement within a year. Specifications are being prepared for bids on additional equipment and new machinery, for added facilities in its electrical plug and radio accessory departments.

New England

Boston, Dec. 4.

THE past week was colorless in the machine tool market, the holiday having a tendency to slow up the little business available. Sales in practically every instance involved single machines, and used equipment figured to a greater extent than new. Additional inquiries developed, all unimportant, but nevertheless swelling the aggregate prospects to sizable proportions. Common opinion among the leading local houses is that business will remain quiet until after the new year. It is intimated by some good prospects that purchases will be made then. The General Electric Co., West Lynn, Mass., is reported to have made up its 1923 machine tool budget, which involves a fairly large number, and there is a possibility of the tools being purchased through the company's Schenectady office.

The Parker Metal Goods Co., Worcester, Mass., recently incorporated under State laws by Arthur H. Parker, founder of the Parker Wire Goods Co., has acquired manufacturing space in the Peter Baker Building, 28 Cherry Street, and will produce general wire hardware, special wire goods and metal stampings. Mr. Parker is president and treasurer of the new company.

Work has been started on a 60 ft. addition to the forging department of the Stanley Rule & Level Co., Southington, Conn., plant, a subsidiary of the New Britain plant. Orders have been placed for new forging machinery.

Frederick M. Ramsdell, Worcester, Mass., founder of the Ramsdell Specialty Co., Inc., recently acquired by the Worcester Electric Supply Co., has organized the Ramsdell Tool & Mfg. Co., which produces screw machine products and machinery. Mr. Ramsdell is president and general man-

ager. Manufacturing space has been secured from the Foster Associates, Inc.

The Old Colony Envelope Co., Westfield, Mass., has purchased a three-story and basement plant on North Elm Street, together with 33,000 ft. of land. Production will start as soon as equipment can be installed.

The M. S. Wright Co., Worcester, Mass., vacuum cleaners, has organized the Sweeper Vac Appliance Co., a subsidiary, with a capital of \$25,000, of which Henry R. King, general sales manager of the parent company, is president; Clifford L. Wright treasurer, and Walter L. Chandler secretary.

The Marlboro Wire Goods Co., High Street, Marlboro, Mass., is having plans prepared for a larger factory to take care of its increased business. A site has not been selected, but financing plans are complete.

William H. Blount, formerly superintendent Sleeper & Hartley, Inc., Worcester, Mass., and Ralph G. Arey, have organized the Arey & Blount Electric Co., capitalized for 100 shares of stock without par value, to manufacture electric flashers. Mr. Arey is president, and Mr. Blount treasurer.

The Reed & Prince Mfg. Co., Worcester, Mass., manufacturer of screws, bolts, nuts and kindred products, will erect immediately two additional buildings, one 60 x 380 ft., one and two stories; the other 90 x 125 ft., one story with monitor roof, to be ready for occupancy late in the spring. The company is now rushed to capacity and additional manufacturing space and larger storage facilities are necessary in spite of the fact that the works were largely increased during the war. The new business includes some foreign orders, but the bulk is from a very wide diversity of customers over the United States. The company has 1150 people on its payroll and is operating with two and three shifts.

The Parker Wire Goods Co., Worcester, Mass., which, as recently announced, will erect a factory on the site of the old Star Foundry, will build a structure 120 x 300 ft., one story, with monitor roof. The present rented space in the Osgood Bradley Building is inadequate and the new factory will permit immediate expansion as well as future growth. Arthur H. Parker, founder of the business, has resigned as president, treasurer and director and severed his connection with the company. Howard W. Nester has been elected treasurer and general manager. The office of president is still vacant.

The Champion International Co., Lawrence, Mass., manufacturer of pulp and fibre products, has commenced foundations for a new one-story machine shop, 62 x 112 ft., for parts production and machinery repairs. Herbert S. Kimball, 177 State Street, Boston, is architect.

The Edison Illuminating Co., 70 State Street, Boston, is arranging an appropriation of \$11,500,000, of which \$7,000,000 will be used for the construction of a 60,000-kw. capacity generating plant on site recently acquired at Weymouth, and \$4,500,000 for extensions and improvements in present power plants and electric substations.

The Safety Car Heating & Lighting Co., Dixwell Avenue, New Haven, Conn., manufacturer of electric heating and lighting equipment for railroad cars, will build a one-story addition, 106 x 115 ft. A. E. Brinkerhoff, 527 Fifth Avenue, New York, is architect.

The Manufacturers' Polishing & Plating Supply Co., Bridgeport, Conn., recently organized with a capital of \$100,000, has leased a portion of the former plant of the Morris Metal Goods Co., Union Avenue, and will install equipment for the manufacture of buffing wheels and tools, plating and polishing equipment, etc. The company is headed by F. T. and H. H. Bristol.

The E. Howard Clock Co., 206 Eustis Street, Boston, has filed plans for a one-story addition estimated to cost \$22,000.

The Atlantic Screen & Wood Products Co., Roxbury, Mass., has leased the three-story factory at 25 Vale Street, for the manufacture of screens and other domestic wire goods, wood specialties, etc.

The Blakeslee Forging Co., Plantsville, Conn., has awarded contract to the Immick Co., State Street, Meriden, Conn., for a two-story forge shop addition, 39 x 45 ft. Greenwood & Noerr, 847 Main Street, Hartford, Conn., are architects.

The Cambridge Motor Co., 195 Massachusetts Avenue, Cambridge, Mass., has awarded a contract to the J. F. Smith Construction Co., Boston, for a two-story and basement service and machine repair works at Massachusetts Avenue and Front Street, 55 x 200 ft., with ell extension, 62 x 66 ft., to cost \$150,000.

The New England Power Co., Worcester, Mass., has preliminary plans for a new central power and distributing plant for the Eastern Massachusetts districts, to cost in excess of \$150,000. New transmission lines will also be built.

Philadelphia

PHILADELPHIA, Dec. 4.

ADDITIONS to be constructed at the plant of the Pennsylvania Sugar Co., 1045 North Delaware Avenue, Philadelphia, will comprise a one and two-story machine shop, power house, and barrel plant. Bids will be called early in January. George H. Earle, Jr., is head.

In connection with a program for new school buildings at Philadelphia, during 1923, for which a fund of \$12,000,000 is being arranged, plans will be drawn for a new industrial high school to cost in excess of \$500,000 with equipment. The Board of Education, William Rowen, president, is in charge.

A three-story automobile service and repair building, 104 x 120 ft., for company trucks and cars, estimated to cost \$25,000, exclusive of equipment, will be erected at 223-27 Lombard Street, Philadelphia, by the Abbot's Alderney Dairies, Inc., 3041 Chestnut Street. Walter Smedley, Stephen Girard Building, is architect.

The Kohler Co., Kohler, Wis., manufacturer of sanitary ware, has acquired property at Thirty-second and Turner Streets, Philadelphia, totaling 15,000 sq. ft., for a three-story branch plant, for which plans will soon be prepared.

The General Electric Co., Witherspoon Building, Philadelphia, has awarded contract to H. E. Baton, 1713 Sansom Street, for a six-story addition to its local plant at Seventh and Willow Streets, to cost about \$80,000.

The Robinson Electric Co., 1135 North Fortieth Street, Philadelphia, has leased property at 809 Race Street for branch works.

The Commercial Truck Co., Twenty-seventh and Brown Streets, Philadelphia, is in the market for an air hammer, type No. 3 Nazel.

The United States Hoffman Machinery Co., 101 Fourth Avenue, New York, manufacturer of clothes-pressing machines, etc., has leased a floor in the building at 1023-25 Race Street, Philadelphia, for a local branch, a portion of the premises to be equipped as a machine repair works.

H. J. O'Donnell, 6106 Vine Street, Philadelphia, operating a sheet metal works, is planning for the installation of a turning machine, sets of 30 and 36-in. rollers, timers' tools, etc.

The Great Eastern Mills Co., 440 Seventh Avenue, Pittsburgh, manufacturer of sugar products, has leased two buildings at 939-41 North Front Street, Philadelphia, and will install pulverizing machinery and other equipment for a branch plant. George H. Earle, 3rd, represents the company locally.

Joseph Meara, 514 Stuyvesant Avenue, Trenton, N. J., operating a machine and automobile repair shop, has acquired property, 148 x 220 ft., at Hermitage Avenue and Artisan Street, for a new motor service and repair works.

The Atlantic City Electric Co., Atlantic City, N. J., will make extensions and improvements in its power house, substations and system in the vicinity of Cape May, N. J., comprising property recently acquired and to be connected with its main system.

A one-story power house, with radial brick stack, 98 ft. high, will be constructed by the Gilbert Wall Paper Co., 728 Linden Avenue, York, Pa., in connection with its proposed two-story wall paper factory at State Street and the Pennsylvania Railroad, 85 x 325 ft. Bids recently called have been rejected and plans are being revised. J. A. Dempwolf, Cassel Building, is architect. Paul C. Gilbert is president.

The Livingood Mfg. Corporation, Lebanon, Pa., has been incorporated with a capital of \$50,000 to manufacture metal goods, camping stoves, etc. Local property has been acquired and machinery will be installed at once. William A. Forry, Lebanon, R. F. D. 6, is treasurer.

The Biehl Wagon & Auto Works, 31 South Fifth Street, Reading, Pa., manufacturer of automobile equipment, etc., will soon call for bids for a new two-story plant, 85 x 200 ft., at West Reading. H. G. Mohn, Mohnton, Pa., is architect. J. Biehl is head.

Chapman & Fisher, Bourse Building, Philadelphia, engineers, have plans for the construction of two storage piers and one coaling pier at Cape May, N. J., the latter to be equipped with machinery for loading, unloading, etc., estimated to cost \$900,000. The owner's name will be announced later. Bids are expected to be called early in February.

The Pennsylvania Equipment Co., Norwood, Pa., machinery dealer, is in the market for a condenser, about 26,000 cu. ft.; also, a six-wheel saddle tank, with separate tender switching engine.

A vocational department will be installed in the new two-story and basement junior high school to be erected at Berwick Street and Seitz Avenue, Easton, Pa., estimated to cost \$350,000, for which bids will be called early in January. William H. Michler, Drake Building, is architect.

The Watson Door & Sash Co. will commence the rebuilding of its plant, recently destroyed by fire, to be two and three stories, 200 x 200 ft., estimated to cost \$100,000, including machinery. W. C. Wagner is president.

The Daniels Motor Co., Reading, Pa., is arranging for additional manufacture at its plant, and will construct engines for its cars in entirety in the future, eliminating outside parts production and local assembling as heretofore. New machinery has been installed in a number of departments and further expansion is planned. George E. Daniels is president.

The Eastern Foundry Co., Boyertown, Pa., will build a one-story machine shop, in addition to its new one-story foundry, 175 x 185 ft., now in course of erection. The latter will be used for pipe production.

A three-story automobile service and repair building, 50 x 100 ft., to cost about \$65,000, will be constructed by the Nanticoke Garage Co., Nanticoke, Pa. Plans are being completed by G. T. Price, 409 Miller Building, Scranton, Pa., architect.

The Cover Electric Co., Huntingdon, Pa., has arranged for a bond issue of \$25,000, the proceeds to be used for extensions and improvements.

A manual-training department will be installed in the new two-story high school, 70 x 165 ft., to be erected at Bridgeport, Pa., for which new bids will be called in January. H. C. Richards, 608 Chestnut Street, Philadelphia, is architect.

Fire, Nov. 30, destroyed a portion of the distributing plant of the Independent Oil Co., Allentown, Pa., with loss estimated at \$60,000, including equipment. It is planned to rebuild.

The Board of Education, Wayne, Pa., is said to be arranging a list of equipment for installation in the manual-training department of the new high school.

The Susquehanna County Light & Power Co., Scranton, Pa., has arranged for a bond issue of \$100,000, a portion of the proceeds to be used for extensions and improvements.

The Electric Foundry & Engineering Co., Tacony, Philadelphia, has installed additional equipment and will specialize in steel castings under 200 lb. A reorganization has taken place. William M. Darlington is president and J. W. Corlison, secretary and treasurer.

The Keystone Boiler Works, Inc., Manayunk, Philadelphia, is in the market for a second-hand rotary bevel shear of capacity up to 1/2-in. plate or heavier.

Baltimore

BALTIMORE, Dec. 4.

PLANS have been authorized by the Curran Motor Radiator Co., Baltimore, for additions, the largest one story, 48 x 120 ft., to increase the capacity from 50 to 500 radiators per day, primarily of type for Ford and Chevrolet cars. The capital will be raised from \$50,000 to \$500,000 for the expansion.

The Bedford Pulp & Paper Co., Richmond, Va., with mill at Big Island, Va., has arranged for a bond issue of \$800,000, a portion of the proceeds to be used for extensions and improvements. Milton E. Marcuse is president.

The Palmetto Light & Power Co., Florence, S. C., will make extensions and improvements in its plant to cost about \$25,000. Additional equipment will be installed.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until Dec. 12 for one motor-driven, back-gear precision lathe, for the local navy yard, schedule 328; until Dec. 19, for a quantity of flashlights and batteries for Eastern and Western yards, schedule 344; one switchboard for the Puget Sound Navy Yard, Washington, schedule 343, and for one patternmaker's lathe, two patternmaker's benches, one saw bench, one hand planer and jointer, for Bellevue, D. C., schedule 335.

E. A. Melton, Balstic, N. C., R. F. D. 1, is in the market for a steam shovel, used, in good condition.

The American Woodworking Co., Sisson Street, Baltimore, will soon take bids for a new one-story plant, 70 x 300 ft., to cost approximately \$30,000. T. G. Pratt, 325 North Charles Street, is architect. Frederick Hershfeld is president.

The Anderson Tractor Co., Anderson, S. C., recently organized with a capital of \$200,000, has plans for new works to cost close to \$75,000 with machinery. Motor-driven tractors in three sizes will be manufactured, with complete parts and assembling departments. W. S. Anderson is president.

The Cape Fear Gravel Pits, Inc., Lillington, N. C., has tentative plans in progress for a plant to manufacture concrete building blocks and tile, estimated to cost \$200,000, including machinery. C. W. Lacy is president.

The Crane Co., 836 South Michigan Avenue, Chicago,

manufacturer of valves, steam specialties, etc., has leased property on West Broad Street, Richmond, Va., for the establishment of a new branch plant.

The Chief Signal Officer, United States Army, Washington, will receive bids until Dec. 19 for electrical equipment, including armature for motor generator, storage batteries, voltmeter, switchboard tools, knife switches, binding posts, etc., as set forth in circular PR 13228-1CP; until Dec. 18 for two condensers, dynamotor, linemen's test sets, vibrators, etc., as set forth in circular PR 12858-1CP.

Fire, Nov. 22, destroyed a portion of the woodworking plant of the DeKalb Supply Co., Decatur, Ga., with loss estimated at \$75,000, including machinery. It is planned to rebuild.

The Crystal Ice Co., Elizabeth City, N. C., will commence the remodeling and improving of its ice-manufacturing plant, including the installation of additional equipment, estimated to cost \$100,000. Ophuls & Hill, 112 West Forty-second Street, New York, are engineers.

The Herfurth Engine & Machinery Co., Alexandria, Va., machinery dealer, has inquiries out for a number of ice machines, belt-driven, inclosed type, in good condition.

The Board of Education, Cary, N. C., has plans in preparation for a new two-story vocational school and expects to take bids in January. C. Gadsden Sayre, Anderson, S. C., is architect.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids until Dec. 20 for a refrigerating and ice-manufacturing plant at the naval base, Pearl Harbor, T. H., specification 4735.

The Tractor Cultivators, Inc., Powell Building, Newport News, Va., William Downie, president, will soon take bids for a new plant at Mansemond, Va., consisting of a main one-story structure, 100 x 100 ft., and smaller building, for the manufacture of farm tractors and kindred equipment. A. Byron Williams, Powell Building, is architect.

The Chapin-Sacks Corporation, Knoxville, Tenn., is planning for the construction of a new three-story ice manufacturing and ice cream plant at Savannah, Ga., estimated to cost in excess of \$80,000, with machinery. The ice-making department will be equipped for a daily output of 150 tons. R. B. Whitney is local manager in charge.

A manual-training department will be installed in the new three-story high school to be erected at Carthage, N. C., for which bids will be called on general contract early in February. C. Gadsden Sayre, Anderson, S. C., is architect.

The Fisheries Products Co., 50 Broad Street, New York, has tentative plans for rebuilding its fertilizer plant at Money Point, Va. It will be one story, 245 x 300 ft., estimated to cost \$200,000, with machinery.

The Glasgow Clay Products Co., Glasgow, Va., has inquiries out for a rotary, mechanical dryer, with capacity for handling 10 tons of shale per hour.

An electric power plant will be constructed by the Republic Cotton Mills, Inc., Great Falls, S. C., in connection with its proposed new textile plant, estimated to cost in excess of \$1,000,000. The machinery for the power station will cost close to \$100,000. J. E. Sirlene, Greenville, S. C., is architect and engineer. Robert S. Mebane is president.

The American Mfg. Co., Martinsville, Va., recently organized with a capital of \$1,000,000, has acquired a local site for the erection of a new plant to manufacture furniture, estimated to cost \$200,000, with machinery. Ground will be broken early in January. A. D. Witten is president and H. N. Dyer, secretary and treasurer.

Pittsburgh

PITTSBURGH, Dec. 4.

MACHINE tool business still runs chiefly to sales of individual tools, but there is a very fair number of such orders and the trade also finds encouragement from negotiations under way. One firm has made a compilation of the number of inquiries it has quoted on during the first 11 months of this year and finds that it runs close to 2000, with a value of between \$1,500,000 and \$2,000,000. Only a relatively small part of this business has been closed and of the remainder, it is thought that much of it will be placed during the coming year.

Crane activities are more prospective than actual. The Carnegie Steel Co. inquiry for three 125-ton ladle cranes for its Duquesne works still is open, although the award is likely this week. The Koppers Co. has yet to place several cranes in connection with new construction at Clairton and Weirton, and the Ohio Pump & Machinery Co.,

Akron, Ohio, has not yet placed two 15-ton cranes for which the inquiry came out a short time ago. Actual business consists of one 35-ton and four 10-ton cranes placed by the Michigan Steel Corporation, Detroit, with the Morgan Engineering Co., Alliance, Ohio. A good many hoist orders are coming along, one maker reporting sales of nine and another of one, the latter a 1-ton pneumatic Detroit hoist. Power equipment like cranes promises better than it is actually selling. The West Penn Power Co. is planning extension of its Springdale, Pa., plant. The Gulf Refining Co. has placed two 5000 kw. turbines for its Port Arthur, Tex., plant with the General Electric Co.

The National Metal Products Co., 1016 East Eleventh Street, Indianapolis, has acquired property, 75 x 138 ft., at Chateau and Fayette Streets, Pittsburgh, as a site for a new branch plant. A specialty will be made of die-castings and kindred products.

The National Forge & Tool Co., Irvine, Pa., is planning for the installation of additional equipment at its plant.

The New Castle Electric Co., New Castle, Pa., has arranged for a bond issue of \$85,000, a portion of the proceeds to be used for extensions and improvements. An appropriation of \$500,000 was recently arranged.

A one-story and basement service and repair building, 85 x 150 ft., for company motor trucks and cars will be constructed by the Pure Oil Co., Thirty-ninth Street and the Junction Railroad, Pittsburgh.

The Clarksburg Ice & Cold Storage Co., Clarksburg, W. Va., will commence the construction of a one-story ice-manufacturing plant, 50 x 120 ft., to cost about \$50,000 with machinery.

A manual-training department will be installed in the new high school to be erected at Weirton, W. Va., estimated to cost \$180,000, for which plans will soon be prepared. The County Board of Education, New Cumberland, W. Va., is in charge.

Fire, Nov. 27, destroyed a portion of the shops, power house and tippie at the mines of the Clifton Coal Co., Clifton, W. Va., with loss approximating \$50,000. It is planned to rebuild.

The Baldwin-Pocahontas Coal Co., Roderfield, W. Va., is planning for the installation of new tippie and other operating equipment at its plant. J. W. Baldwin is president and general manager.

The Cutler Steel Co., Bowman Building, Pittsburgh, is perfecting plans for the early operation of its new plant at New Cumberland, W. Va., comprising the former works of the National Steel Castings Co. Improvements will be made.

The West Penn Power Co., West Penn Building, Pittsburgh, is arranging for the commencement of work on its addition at Springdale, Pa. The unit will be larger than the present station, and is estimated to cost \$6,000,000. A. M. Lynn is president.

The Philadelphia & Cleveland Coal Co., Rockefeller Building, Cleveland, is planning for the construction of a new steel tippie on site recently acquired in the vicinity of its properties at Huntington, W. Va.

The Centre Foundry & Machine Co., Warwood, W. Va., has awarded a contract to the Riverside Bridge Co., Martins Ferry, Ohio, for a one-story foundry, 100 x 320 ft., at Wheeling, W. Va. F. H. Young is general manager.

The Coal River Collieries Co., Huntington, W. Va., will install new electrical equipment, including motors, substation apparatus, etc., at its properties adjoining its works, for the manufacture of automobile equipment. A. G. Wickersham, 517 McClure Avenue, Homestead, Pa., is architect.

The National Radiator Co., Central Avenue and Ohio Street, Johnstown, Pa., is completing plans for a new one-story foundry, 30 x 350 ft., at New Castle, Pa., for the manufacture of stove and radiator castings. J. E. Adams, Nemo Building, Johnstown, is engineer.

The Virginian Railway Co., Norfolk, Va., is said to be planning for the erection of new locomotive and car shops at Justice, W. Va., where a site has tentatively been selected.

The Howard Smokeless Coal Co., Clarksburg, W. Va., recently organized, has acquired the plant of the Byers Coal Co., at Byrer Tugart Junction, Barbour County, W. Va. Plans are under way for enlargements, including the installation of new machinery. Daniel Howard heads the company.

The Owens Bottle Co., 1401 Nicholas Building, Toledo, Ohio, will soon call for bids for a one-story addition to its plant at Charleston, W. Va., 120 x 200 ft., estimated to cost approximately \$150,000, with machinery. The Devore Co.,

Nicholas Building, Toledo, is engineer. E. D. Libbey is president.

The Kentucky & West Virginia Power Co., Logan, W. Va., is planning to rebuild its power plant recently destroyed by fire, with loss approximating \$30,000.

The Auto Truck Equipment Co., 7511 Penn Avenue, Pittsburgh, is taking bids for a new one-story and basement plant, 31 x 100 ft.

Buffalo

BUFFALO, Dec. 4.

THE New Process Gear Co. of Delaware, Syracuse, N. Y., has been organized by T. W. Warner, of the T. W. Warner Corporation, Toledo, Ohio, and W. C. Durant, head of the Durant Motors, Inc., New York, with capital of 300,000 shares of stock, no par value, to operate the local plant of the New Process Gear Corporation, recently acquired. Plans are being prepared for enlargements for the manufacture of gears and transmissions for the Durant and Star cars. T. W. Warner heads the new company; C. R. Burt is manager.

A vocational department will be installed in the three-story high school, 80 x 150 ft., to be erected on Prospect Street, Attica, N. Y., estimated to cost \$294,000, for which ground will be broken at once. Morris & Allen, Prudential Building, Buffalo, are architects.

The Cooper Electric Corporation, Hilton, N. Y., is planning for the construction of a new one-story power plant at Parma, N. Y., to cost \$55,000.

Fire, Nov. 25, destroyed the car barn and repair shop of the New York State Railways Co., Oneida, N. Y., with loss estimated at \$100,000, including equipment.

Power equipment, conveying and other mechanical equipment will be installed in the new one-story printing plant, 100 x 200 ft., to be erected by the A. S. Gilman Printing Co., 623 St. Clair Avenue, Niagara Falls, N. Y., for which a general building contract has been awarded to Wright & Kremers, Gluck Building, Niagara Falls.

Cedric L. Lloyd and W. B. Ellis, Lockport, N. Y., have organized the Master Gear Co., to operate a plant for the manufacture of gears and transmissions for automobiles.

A vocational department will be installed in the two-story and basement senior and junior high school, 150 x 150 ft., to be erected at Owego, N. Y., estimated to cost \$275,000. Coffin & Coffin, 522 Fifth Avenue, New York, are architects.

The North East Electric Co., Rochester, N. Y., will purchase a used No. 66 Jarecki pipe machine and a standard Wieland 6-in. pipe threader and cutter.

Detroit

DETROIT, Dec. 4.

THE Michigan Stamping Co., Mack Avenue, Detroit, manufacturer of stamped metal products, has plans for a one-story addition, 140 x 350 ft., to be used in part as a machine shop, and the remainder for general manufacture. Albert Kahn, 1000 Marquette Building, is architect. Walter F. Tant is secretary.

Fire, Nov. 19, destroyed the machine shop, laboratory and other buildings at the plant of the Petroskey Portland Cement Co., Petroskey, Mich., with loss estimated at \$50,000. It is planned to rebuild the structures in connection with extensions and improvements to be made to the mill, to cost approximately \$500,000.

The Michigan Copper & Brass Co., 5851 West Jefferson Street, Detroit, has filed plans for a one-story addition, to cost \$30,000.

Officials and stockholders of Sears, Roebuck & Co., Arthington and Homan Avenues, Chicago, have acquired the plants of the Eddy Paper Co., Three Rivers and White Pigeon, Mich. The Eddy Paper Co. of Illinois has been organized to operate the properties. Extensions and improvements will be made.

The Detroit Public Heating Commission, 174 East Atwater Street, Detroit, has plans nearing completion for a new main municipal electric power plant, substation and transmission system, to cost approximately \$5,000,000. Smith, Hinchman & Grylls, 800 Marquette Building, are architects.

The United Produce Co., Lansing, Mich., has plans for a new four-story ice-manufacturing and cold-storage plant, 85 x 280 ft., estimated to cost about \$200,000, including equipment. Warren M. Holmes, Tussing Building, is architect.

The Detroit Edison Co., 2000 Second Avenue, Detroit, has preliminary plans under way for a new generating plant at Slocums Island, Mich., to cost approximately \$8,000,000. A new power house is also contemplated at

Ecorse Avenue and Dearborn Street, Detroit, and foundations are in progress for a one-story electric substation on Savannah Street, to cost \$50,000. Alexander Dow is president and general manager.

Chicago

CHICAGO, Dec. 4.

THE Chicago, Burlington & Quincy has placed some of the equipment against its list and will probably conclude purchases during the week. Its total expenditure for machine tools, including those purchased a few weeks ago, is expected to reach \$500,000. The Chicago, Milwaukee & St. Paul has not yet taken action against its inquiry. Inquiries from industrial sources are numerous, but orders are slow in coming through. In some cases users indicate that they will delay buying until after the first of the year. One of the largest individual purchases recently made was closed by the Chicago, Wilmington & Franklin Coal Co. for its mine at West Frankfort, Ill. The following motor-driven machines were bought: A 25-in. shaper, 4-ft. radial drill, 28-in. upright drill, 12-in. x 6-ft. engine lathe, 20-in. x 14-ft. engine lathe, 36-in. x 18-ft. engine lathe, two floor grinders with 14 x 2-in. wheels and a hack saw.

In general, the sales totals of local machine tool houses for November were not equal to those of the previous month, although one dealer had the best month of the year and another booked fully as much business as in October.

The only price change reported was an advance of about 10 per cent on a number of sizes of power hack saws by the Racine Tool & Machine Co., Racine, Wis.

The Interstate Iron & Steel Co., Chicago, is inquiring for a No. 2 Diamond automatic surface grinder with a capacity of 36 x 12 x 12 in. and arranged for motor drives.

The Niagara Radiator & Boiler Co., Chicago, has ordered a 10-ton overhead electric traveling yard crane from the Erie Steel Construction Co., Erie, Pa.

Wilson & Jaspert, Inc., 578 Douglas Avenue, West Hammond, Ind., recently organized with \$4,800 capital stock, will manufacture complete phonograph and radio sets, and also a combination phonograph and radio receiver in the same cabinet. The company has leased a plant containing 6000 sq. ft. of floor space on Hoffman Street, Hammond. Its machine requirements have been partially filled, but it will soon be in the market for some small machine shop equipment, including several drill presses. Officers are Arthur L. Wilson, president; William P. Heckman, vice-president, and George H. Jaspert, secretary-treasurer.

The Anderson Electric Works, Inc., 212 West Austin Avenue, Chicago, recently organized with \$25,000 capital stock, will repair, buy and sell motors, generators, and electrical equipment. It has leased 6500 sq. ft. at the address given and has purchased all of its equipment. Officers are A. C. G. Anderson, president; J. C. A. Anderson, vice-president; E. H. Johnson, secretary and treasurer, and Max V. Boreing, manager and superintendent.

The Muehlhausen Spring Co., manufacturer of phonograph springs, 5841 Loomis Street, Chicago, will receive bids through an architect on a one-story factory, 100 x 142 ft., at 5811-19 South Western Avenue, to cost \$40,000.

The Golden Rule Cutlery Co., 212 Sheldon Street, Chicago, has let contract for remodeling its factory at a cost of \$16,000.

B. Heller & Co., manufacturing chemists, 3925 Calumet Avenue, Chicago, have taken bids on a four-story addition, 62 x 380 ft., to cost \$100,000.

The Central Manufacturing District, Chicago, has commenced the construction of a three-story plant, 150 x 205 ft., on Forty-seventh Street just west of Spaulding Street, for the Superior Furniture Corporation, a new company. The building and land will represent an investment of \$200,000.

The Chicago Metallic Mfg. Co., manufacturer of household metal ware, 544 West Thirty-fifth Street, Chicago, has purchased the plant at 3711-19 South Ashland Avenue, occupied by the Eveready Co., a subsidiary of the National Carbon Co. The building contains 90,000 sq. ft. of floor space. The Eveready Co., which manufactures electric novelties, will occupy the vacated plant of the Oxweld Acetylene Co., at Thirty-sixth Street and Jasper Place.

The Studebaker Corporation, South Bend, Ind., plans further expansion of its facilities. An addition to the closed-car body plant will be 172 x 518 ft. and four stories. An

extension to the power house, 48 x 116 ft., two stories, is now being erected. Improved arrangements for the final inspection and testing of cars will be provided by a one-story glass-covered building, 40 x 624 ft., which will connect the shipping and storage department with the final assembly department. There will also be a new four-story car storage building, 76 x 624 ft., and a train shed, 80 x 624 ft. These buildings are part of a general expansion program which includes also two additions to the Studebaker plants at Detroit. One of these units will be a five-story building, 58 x 441 ft., to house final assembling and testing departments and the other a structure, 95 x 248 ft., for various machining operations and stores. All of the buildings will be of reinforced concrete.

The Damascus Steel Co., a new industry which is erecting a plant on a 10-acre site near the Standard Steel Car Co. works, Hammond, Ind., has completed the concrete foundations for its principal buildings.

The American Seating Co., Grand Rapids, Mich., is building a power plant and warehouse to cost \$400,000.

Traum & Lien, Fairbury, Neb., will remodel the Marthis tire shop into a machine shop.

Milnes Brothers, 3453 Prairie Avenue, Chicago, operating a sheet metal works, will build a one and two-story addition, 45 x 50 ft., to cost \$20,000. Lyman J. Allison, 115 South Dearborn Street, is architect.

A vocational department will be installed in the three-story-and-basement junior high school, 164 x 175 ft., to be erected at Webster City, Iowa, estimated to cost \$290,000. William Gordon, 319 Hubbell Building, Des Moines is architect.

The Wabash Railroad Co., St. Louis, has preliminary plans for a new locomotive repair and machine shop at Decatur, Ill., and expects to call for bids early in 1923. George F. Hess, Decatur, is division superintendent.

The Common Council, Shelbyville, Ill., has plans nearing completion for a municipal electric light and power plant. Bonds for \$100,000 have been voted. A. W. Fuller, 1979 Railway Exchange Building, St. Louis, is engineer.

The Commanding Officer, Rock Island Arsenal, Rock Island, Ill., will receive bids until Dec. 13 for 450 roller bearings, 20 ball bearings and 40 radial thrust bearings, as specified in circular OAP-35419A.

The Marquette Cement Mfg. Co., 140 South Dearborn Street, Chicago, Ill., will make extensions and improvements in its plant at West Davenport, Iowa, to cost \$100,000.

A manual-training department will be installed in the two-story-and-basement high school to be erected at Carbondale, Ill., estimated to cost \$110,000, for which bids are being received until Dec. 18 on general contract. Beuttler & Arnold, Grain Exchange Building, Sioux City, Iowa, are architects.

The Universal Portland Cement Co., 210 South La Salle Street, Chicago, is arranging for a one and two-story addition to its plant at Morgan Park, Duluth, Minn., to cost \$235,000. The work will consist of extensions in the grinding department, burner building and power house.

A manual-training department will be installed in the new two-story-and-basement high school to be erected at Corydon, Iowa, estimated to cost \$135,000. William Gordon, 319 Hubbell Building, Des Moines, is architect.

The Hurley Machine Co., West Twenty-second Street, Cicero, Ill., manufacturer of electric washing and ironing machines, is taking bids for a one-story addition, 61 x 130 ft., to cost approximately \$35,000. Edward Hurley is president.

The Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., is inquiring for an engine lathe of 20-ft. bed and 36-in. swing.

The Universal Packing Co., 190 North State Street, Chicago, is in the market for used imperial X B2 Ingersoll-Rand air compressors, sizes 14 x 9 x 12; 16 x 10 x 14; 19 x 12 x 16. Laidlaw feather valve machines will also be considered.

Hill, Clarke & Co. Improvements

Hill, Clarke & Co., 649 West Washington Street, Chicago, dealers in re-manufactured machine tools, have completed improvements to the store at that address. Additional office space, 20 x 30 ft., has been provided, and a warehouse, 40 x 80 ft., has been added at the rear of the building. The warehouse is equipped with a monorail hoist system, which has also been extended into the show room. Large doors opening from the alley permit motor trucks to be driven into the building and machines to be unloaded and conveyed to any portion of the warehouse or show room by the overhead hoist. The company has a plant and warehouse at 2100 South Kilbourn Avenue, Chicago, where machine tools are re-manufactured and stored. The new warehouse at the store will materially increase the company's storage facilities.

Cleveland

CLEVELAND, Dec. 4.

RAILROAD buying featured the local machinery market the past week. The Pennsylvania Railroad placed six large and two small turret lathes with a Cleveland manufacturer for its Altoona shops and the New York Central purchased two turret lathes from a Wisconsin maker. The Chicago, Burlington & Quincy has purchased three double end punching machines from a Cleveland manufacturer. Local machinery houses report a fair volume of orders mostly for single tools, but inquiry is not active as many prospective purchasers have advised the trade that they will postpone buying until January. Single tool orders are well distributed among automobile accessory manufacturers, brass plants and other industries. Some inquiry has come from the Ford Motor Co. for equipment for its new plant at Green Island, N. Y., one that reached a local machinery builder being for six screw machines. The Canton Car Co., Canton, Ohio, will enlarge its facilities for car repair work and expects to buy one or more cranes and probably some machine tools.

New inquiries include one from the Taplin Stove Co., Mansfield, Ohio, for a multiple spindle drilling machine and one from the East Iron & Machine Co., Lima, Ohio, for a riveting machine.

The plant of the Yoder Co., Cleveland, manufacturer of sheet metal work and machinery, was partially destroyed by fire a few days ago. The building containing the manufacturing departments equipped with about 40 machine tools was burned and it is expected that only from 25 to 40 per cent of these can be salvaged. The company is rebuilding this portion of its plant and expects to be operating again in a few days. It will be in the market shortly for machinery to replace the tools lost in the fire.

The E. N. Riddle Co., Toledo, Ohio, manufacturer of lighting fixtures, will enlarge its plant by the erection of buildings to be used for foundry and other purposes.

The Alliance Machined Steel Casting Co., Alliance, Ohio, will build a 75 x 600 ft. extension to its foundry, nearly doubling its present capacity.

The Archbold Ladder Co., Archbold, Ohio, will erect a two-story building, 40 x 110 ft.

The Towmotor Co., Cleveland, has received an order from Stafford & Myer, Port Louis, Island of Mauritius, for tractors and trailers amounting to approximately \$30,000. It has also recently taken an order from the Lehigh Valley Railroad for Pier 8, New York, an additional order from the Van Dorn Iron Works, Cleveland, two orders from London, England, and one from the Keystone Steel & Wire Co., Peoria, Ill.

The Miller Rubber Co., Akron, Ohio, will erect two additional factory buildings, 70 x 105 ft., and 40 x 42 ft.

The Republic Structural Iron Works, 1290 East Fifty-third Street, Cleveland, is inquiring for a 1-in. capacity gate shear, 96-in. blade and 36-in. throat, or size near to this, and for a gate shear of capacity $\frac{3}{4}$ or $\frac{1}{2}$ -in. plate by 120-in. blade or size near.

Milwaukee

MILWAUKEE, Dec. 4.

CONSIDERABLE encouragement has been given the machine-tool trade by an increase in inquiries based on immediate needs and requirements to be placed early in the new year. Railroad business is slightly more prominent, local shops having booked a number of single-tool orders embraced by fairly large lots placed in Chicago and Eastern markets. In addition, a fair list is expected to come out soon for a new car repair shop which the Lake Superior & Ishpeming road will build in Marquette, Mich. Automotive industries are making inquiry for miscellaneous tool room and production equipment, most of which is expected to be placed shortly after Jan. 1. Throughout Wisconsin general industrial activity involving metal-working operations is increasing to the point where extensions of capacity will soon require additional equipment beyond replacement needs. Confidence is expressed that December sales will equal if not

slightly exceed the volume reached in October and November.

M. Tullgren & Sons, architects, 425 East Water Street, Milwaukee, have been engaged by the Creamery Package Mfg. Co., Chicago, to design a new three-story brick, steel and concrete manufacturing plant, 165 x 266 ft., to be erected at West Division and North Kostner Avenue, Chicago. It manufactures dairy equipment and supplies. Contracts will be let about Jan. 1.

Contracts are being let by the Lake Superior & Ishpeming Railroad Co., Marquette, Mich., for a new car repair shop which will cost about \$50,000 and require considerable tooling. The Wisconsin Bridge & Iron Co., Milwaukee, has taken the structural steel work, involving about 200 tons.

The Rice Lake, Wis., Board of Education has engaged E. J. Hancock, architect, Eau Claire, Wis., to design a combination high and vocational training school, estimated to cost \$150,000, and to be built early next spring. Dr. F. A. Tate is president of the board.

The Northern Supply Co., Chippewa Falls, Wis., a new \$50,000 corporation organized to manufacture telephone, telegraph and power transmission line supplies, has started work on the erection of a two-story brick factory, 40 x 120 ft., to be ready Jan. 15. Most of the equipment will be for wood-working operations on poles, cross-arms, brackets, pins, braces, etc. J. M. Bischell, formerly of Bloomer, Wis., but for several years engaged in similar business at Baltimore, Md., is president and general manager.

The Kools Mfg. Co., Appleton, Wis., incorporated several months ago with \$25,000 capital stock to manufacture potato-paring machines and other labor-saving devices, has leased a part of the plant of the Appleton Motor Truck Co. and will start quantity production Jan. 1. Up to this time a limited output has been effected through contracts with local foundries and machine shops. William Kools is president; Edward Kools, vice-president, and Frank Kools, secretary-treasurer.

The Dry Milk Co., 15 Park Row, New York, has plans for a Western plant to be erected at Columbus, Wis., at a cost of \$125,000. It will be of brick and concrete, 200 x 250 ft., two stories and basement, with steel sidewall and monitor sash. Bids are now being taken on the building. Equipment will be purchased through the headquarters in New York.

The Lindsay Light & Power Co., Waupaca, Wis., has been authorized to issue bonds of \$45,000 for the construction and equipment of a hydroelectric generating plant, plans for which have been completed. Contracts will be let about Jan. 1.

The Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., will enlarge its paper mill and hydroelectric generating plant at Stevens Point, Wis., at an estimated cost of \$350,000 early in 1923, according to announcement made by George W. Mead, secretary-treasurer and general manager. Specifications are expected to be ready by Jan. 15 or Feb. 1. L. A. DeGuere is consulting and contracting engineer.

The Filedex Corporation of America has been incorporated at Green Bay, Wis., with a nominal capital of 3000 shares of non-par valued common stock, to manufacture patented filing cabinets. It has leased the former plant of the Lawson Airplane Co. and is buying miscellaneous equipment, including some precision tools. J. E. Lederman of Chicago, formerly with the Addressograph Co., International Register Co. and factory manager Hess Ball Bearing Co., is patentee of the device and has been engaged as general works manager. E. H. Mayhew, formerly of the Woodstock Typewriter Co., is president; H. A. Minahan, vice-president; Joseph Kabat, secretary, and Charles J. Loignon, treasurer, all of Green Bay.

The Janesville Caloric Corporation, Janesville, Wis., has been incorporated with an authorized capital of \$500,000 to take over the plant and business of the Caloric Co., Janesville, manufacturer of fireless cookers, but for several years producing opera chairs for the Stafford Co., Chicago. The new owners will on Jan. 1 resume the manufacture of fireless cookers and begin the production of electric cookstoves, later adding other lines of electrically operated household devices. Officers of the new company are: President, Charles Touton; vice-presidents, Walter Magill, M. A. Hudson; secretary and manufacturing superintendent, Frank Coyle; treasurer, Clarence G. Sutherland.

The Wisconsin Steel & Dock Co., Milwaukee, has been incorporated in Wisconsin with a nominal capital of 3000 common shares without par value, to engage in the construction and equipment of vessels, operate a drydock, fabricate hulls and boilers, and do a general marine contracting business. It takes over a shipbuilding plant partially developed during the war at Kewaunee, Wis., and will establish a smaller drydock and shop plant in Milwaukee.

ree as well. The principals are F. W. Stevens, A. E. Schunk and Louis Hoffman, all of Milwaukee.

The South Side Buick Co., Milwaukee, has been organized with \$40,000 and has acquired a building at Fourteenth and Forest Home Avenues and will rebuild it and install equipment for servicing automobiles, trucks, tractors, etc. John Piszczek, 448 Mitchell Street, is general manager.

The Stratford Light & Power Co., Stratford, Marathon County, Wis., will build a hydroelectric generating plant, with steam auxiliary, and a distributing system at an estimated cost of \$50,000.

Cincinnati

CINCINNATI, Dec. 4.

THE past week was unusually quiet in the machinery market, due principally to the intervening holiday and the fact that the Christmas season is drawing closer. The only important inquiry to come out was from the Missouri Pacific Railroad, which calls for 53 items. With this exception inquiries and orders were confined almost entirely to single machines. There has, however, been some railroad buying, and the Pennsylvania Railroad is reported to have placed nearly all its requirements with the exception of lathes. The Big Four bought a 54-in. driving wheel lathe. Manufacturers of special machinery and small machines report fair orders.

The Missouri Pacific Railroad, E. A. Howe, purchasing agent, Railway Exchange Building, St. Louis, has sent out the following inquiry, under file No. 3245:

One 200-ton locomotive hoist.
One 2 x 24-in. flat turret lathe.
One 3-in. heavy duty turret lathe.
One 5-in. heavy duty turret lathe.
One No. 2 center driven axle lathe.
One 16 x 10-in. tool room lathe.
One 20 x 6-in. monitor lathe.
Two 16 x 8-in. portable engine lathes.
One 54-in. car wheel lathe.
Two 16-in. x 8-ft. engine lathes.
Two 22-in. x 10-ft. engine lathes.
Two 24-in. x 10-ft. engine lathes.
One 30-in. x 17-ft. engine lathe.
One 42-in. x 12-ft. engine lathe.
One 36-in. x 12-ft. engine lathe.
One 36-in. driving wheel press.
One 6-ft. semi-universal radial drilling machine.
One 2-in. spindle, high-speed drilling machine.
One 36-in. upright high-speed drilling machine.
One 42-in. upright high-speed drilling machine.
One 30 x 30-in. x 8-ft. planing machine.
One 36 x 36-in. x 12-ft. planing machine.
One 48 x 48-in. x 18-ft. planing machine.
Two 26-in. shapers.
One 18-in. crank slotter.
One 24-in. upright high-speed turret drilling machine.
One 100-ton hydraulic bushing press.
One No. 2 universal milling machine.
One No. 5 horizontal milling machine.
One 36-in. horizontal vertical boring mill.
One 42-in. rapid production boring and turning mill.
One 54-in. rapid production boring and turning mill.
One 2½-in. double head bolt threader.
One 1½-in. double head bolt threader.
One 36-in. heavy duty Morton draw-cut shaper.
Five 2-wheel floor grinders.
One No. 1 universal grinder.
One wet tool grinder.
One 1½-in. bolt header.
Three 48-in. grind stones.

All of these machines are to be equipped for alternating current, 440-volt, three-phase, 60-cycle motors.

The Trailmobile Co., Cincinnati, has awarded contract to the Austin Co., Cleveland, for a new plant and warehouse adjacent to its present property in the Oakley district. The present plant has been sold to the Fay & Eagan Co. Work has commenced and it is expected that the Trailmobile Co. will occupy the plant on February 1. Little new equipment will be required. Murray Shipley is president.

Fire at the plant of the Post-Glover Electric Co., Ludlow, Ky., Nov. 28, caused damage estimated at \$25,000. The company manufactures electrical devices and will rebuild as soon as plans can be completed. F. B. VanWinkle is president.

The Brightman Mfg. Co., Columbus, Ohio, manufacturer of cold rolled shafting and highly finished nuts, has been reorganized by a group of Chicago men who have purchased the holdings of the Brightman family. The business will be

continued in its present location. J. P. Dods, formerly manager, is vice-president of the reorganized company. W. C. Waggoner, who was president of the new company, died suddenly in Columbus on Nov. 28, but his death will make no change in the company's plans.

The Irwin Augur Bit Co., Wilmington, Ohio, recently occupied its new forge plant. The company reports orders so heavy that more men are now being employed than ever before in its history.

The Fairbanks Co., Springfield, Ohio, piano plate manufacturer, will shortly call for bids for an addition to replace the part destroyed by fire on Nov. 11. M. L. Milligan is president.

The Wellston Mfg. Co., Wellston, Ohio, is contemplating the erection of an addition and is planning to double its capital stock. The company manufactures heating furnaces as well as several specialties. I. W. Warden is president.

Indiana

INDIANAPOLIS, Dec. 4.

CONSTRUCTION will begin on a one-story addition to the municipal electric power plant, Crawfordsville, Ind., to cost \$200,000, including machinery. Carroll & Brening, 511 Traction Terminal Building, Indianapolis, are engineers.

The Kokomo Steel & Wire Co., Kokomo, Ind., has commenced the erection of a one-story addition, 90 x 425 ft., to be used for a galvanizing department, estimated to cost \$55,000.

The Wabash Valley Electric Co., Clinton, Ind., is planning for the installation of power and line equipment in Vigo County, for connection between its generating plants at Clinton and Sullivan.

The Standard Oil Co., of Indiana, Indianapolis, has called a special meeting of stockholders on Dec. 28 to arrange for an increase in capital from \$140,000,000 to \$250,000,000, a portion of the proceeds to be used for extensions and improvements.

A manual-training department will be installed in the new three-story high school to be erected at Laporte, Ind., estimated to cost \$300,000, for which ground will be broken at once. Miller, Fullenwider & Dowling, 6 North Michigan Avenue, Chicago, are architects.

The Kunkel Valve Co., Fort Wayne, Ind., has foundations under way for a new one-story plant, 75 x 150 ft., to cost about \$35,000. The Austin Co., 208 South La Salle Street, Chicago, is engineer in charge.

The Gary Street Railway Co., Gary, Ind., is arranging an appropriation of \$500,000 for the extension of its traction line, power house and electric system, additional rolling stock, shop equipment and facilities for repairs.

In connection with the acquisition of the coal railroad division of the Chicago & Eastern Railway, La Crosse, Ind., by the Chicago, Attica & Southern Railroad Co., Attica, Ind., for \$250,000, plans are being developed for the use of motorized equipment on the road, and purchases will be made at an early date. Shop facilities will also be provided for the repair of electric rolling stock. The line acquired is 145 miles long.

The Central Indiana Power Co. has awarded contract for its new 40,000-kw. power station on the Wabash River, near Terre Haute, to Stone & Webster, Inc., Boston. This company, which is under the management of Kelsey Brewer & Co., of Grand Rapids, Mich., is a consolidation of utilities serving 70 cities centering in Indianapolis. The consolidation project involves additional financing to the extent of approximately \$12,000,000.

The Gulf States

BIRMINGHAM, Dec. 4.

EVANS & MEADE, engineers, have been engaged by the Common Council, Florence, Ala., to prepare plans for the new municipal hydroelectric generating plant on Cypress Creek, estimated to cost \$250,000, with equipment.

The Crossett Lumber Co., Crossett, La., has tentative plans for a new plant, with machine shop, power house and other buildings, estimated to cost approximately \$1,000,000 with machinery. Later it is proposed to build a mill on adjoining tract for the production of wood pulp.

The Imperial Oil Co., Tampa, Fla., is planning the construction of a new plant to manufacture lubricating oils, with initial output of 500 gal. per day. A pumping plant, machine shop and other auxiliary buildings will be erected, to cost \$75,000. W. F. Miller is president.

The Southern Railway Co., Washington, has tentative plans for new repair shops at Gadsden, Ala. W. H. Thrall is chief engineer. Fire, Nov. 26, destroyed a portion of the

loading docks and conveyor system of the company at Port Chalmette, near New Orleans, used for grain elevator service, with loss estimated at close to \$75,000. It is planned to rebuild.

The Dothan Machine Shop, Dothan, Ala., is planning to rebuild its machine works on East Burdeshaw Street, destroyed by fire Nov. 20. An official estimate of loss has not been announced.

The Caddo Ice, Light & Power Co., Caddo, Tex., plans for extensions and improvements in the electric power and ice-manufacturing plant, recently acquired; additional equipment will be installed. The company was organized to take over and operate the utilities. S. T. Swenson is president, and W. I. Wright manager.

Vocational departments will be installed in the two junior high schools to be erected at Tenth and Hubbard Streets, and Stockton and College Streets, Jacksonville, Fla., by the Duval County Board of Public Instruction, each two and three stories, 160 x 250 ft., estimated to cost \$275,000. Greeley & Benjamin, Jacksonville, are architects.

The Hoffman-Burleigh Mfg. Co., Daytona, Fla., recently organized, will build a one-story plant, 60 x 100 ft., for the manufacture of sash, doors, etc. All machinery will be individually motor-driven. W. A. Hoffman is president and manager.

The Tropical Radio Telegraph Co. Miami, Fla., operated by the United Fruit Co., 17 Battery Place, New York, is planning the construction of a new local wireless transmitting station, with complete power plant, steel towers 437 ft. high, and other primary equipment. George S. Davis is general manager.

The Southwest Gas & Electric Co., Shreveport, La., will issue bonds for \$2,500,000, a portion of the proceeds to be used for extensions and improvements.

A. F. Messick, Lakeland, Fla., is in the market for a stone-crushing plant, with auxiliary machinery, to have a daily capacity from 150 to 200 tons.

The Gulf States Steel Co., Birmingham, is perfecting plans for the electrification of its bar mill at Gadsden, to include the construction of a transmission line and the installation of motors, controllers, switchboard and other equipment at the mill. C. A. Moffett is president.

A manual-training department will be installed in the new high school to be erected at Georgetown, Tex., for which plans have been prepared by C. H. Page & Brothers, Austin, Tex.

The Marland Oil & Refining Co., Ponca City, Okla., is considering plans for a new seaboard oil terminal and distributing plant in the vicinity of Texas City, or Galveston, Tex., estimated to cost \$150,000, with equipment.

The Common Council, McLean, Tex., will issue bonds for \$30,000, for the installation of a municipal electric light and power plant.

The Acme Flooring Co., Hattiesburg, Miss., recently organized with a capital of \$500,000, is perfecting plans for a factory to manufacture hardwood flooring. A power house will also be erected.

Material-handling equipment, including elevating and conveying machinery, will be installed by the Board of Harbor Commissioners, New Orleans, in connection with the proposed construction of new warehouses and dock improvements, estimated to cost \$6,000,000.

The General American Tank Car Corporation, 111 West Monroe Street, Chicago, has arranged for a bond issue of \$1,000,000, the proceeds to be used in connection with the erection of a new car works on site of 300 acres recently acquired at Good Hope, near New Orleans.

The Central South

ST. LOUIS, Dec. 4.

A TWO-STORY and basement enameling plant, 80 x 125 ft., is being built by the Odorless Refrigerator Co., West First Street, Chattanooga, Tenn., a subsidiary of the Tennessee Furniture Co. W. H. Sears, James Building, is architect. Gaston G. Raoul is president.

A manual-training department will be installed in the high school to be erected at Hugoton, Kan., for which bids on a general contract are being asked. Lorentz Schmidt & Co., Wichita, Kan., are architects.

Fire, Nov. 21, destroyed the plant of the D. M. S. Motor Repair Co., Kansas City, Mo., with loss estimated at \$45,000. It is planned to rebuild.

Alexander & Baity, 535 West Commercial Street, Springfield, Mo., have tentative plans under way for a new electric light and power plant at Bolivar, Mo., to cost about \$35,000.

The St. Louis & Southwestern Railroad Co., St. Louis, is arranging a fund of \$5,000,000 for extensions and improve-

ments during 1923, to include the erection of new locomotive and car shops, and extensions to existing plants, with the installation of considerable new machinery.

The Phillips & Buttorff Mfg. Co., 217 Third Street, North, Nashville, Tenn., manufacturer of stoves, tin producers, etc., has completed plans for a new one-story building, 175 x 300 ft., to cost approximately \$35,000. Marr & Holman, Stalman Building, are architects.

The Knox Porcelain Co., Knoxville, Tenn., recently organized with a capital of \$370,000, will commence the erection of a new plant on five acres, lately purchased. It will consist of three individual units, to be equipped for the most part for the manufacture of electrical porcelain specialties, and is estimated to cost in excess of \$100,000. J. N. House is president.

A complete machine department for parts production and repair work will be installed in the new two-story and basement garage and service building, 150 x 200 ft., to be erected by the Louisville Garage Co., Louisville, on Fifth Avenue, estimated to cost \$225,000, with equipment. Lee R. Miles is president. D. X. Murphy & Brothers, Louisville Trust Building, are architects.

The Paducah Ice Co., Paducah, Ky., will commence the erection of a two-story and basement ice manufacturing plant, 75 x 220 ft., at 1222 South Third Street, to cost \$250,000, with machinery. The Pillsbury-Becker Engineering Co., St. Louis, is engineer.

The White Eagle Oil & Refining Co., Wichita, Kan., has arranged for an increase in capital from 320,000 to 640,000 shares of stock, no par value, a portion of the proceeds to be used for refinery extensions and improvements.

An electrically-operated pumping plant will be installed by the Common Council, La Plata, Mo., in connection with extensions and improvements in the municipal waterworks to cost \$190,000. Black & Veatch, 701 Mutual Building, Kansas City, Mo., are engineers.

The Federal Can Co., Nashville, Tenn., is planning for the erection of a one-story addition to cost \$20,000.

The Yahola Sand & Gravel Co., Yahola, Okla., will increase the capacity of its plant from 100 to 150 cars. Additional machinery for washing, sorting, screening, etc., will be installed. W. S. Dills is president and general manager.

The Smith Furniture Co., 5955 Easton Avenue, St. Louis, is taking bids for a new three-story plant, 128 x 145 ft., at Seventh and Washington Streets, to cost \$100,000. Wedemeyer & Nelson, Wainwright Building, are architects.

The Taylor Paper Co., Memphis, Tenn., has tentative plans under way for the construction of a new branch mill estimated to cost approximately \$100,000, including equipment.

The Knoxville Power & Light Co., Knoxville, Tenn., is disposing of a bond issue of \$300,000, a portion of the proceeds to be used for extensions and improvements.

The Nashville Railway & Light Co., Watkins Building, Nashville, Tenn., is planning for extensions and improvements in its power plants and system, including the installation of turbo-generators, boilers and other equipment, estimated to cost \$500,000. E. C. Edgar is general manager.

The Interstate Refiners, Inc., Kansas City, Mo., operating oil refineries, is perfecting plans for an increase in capital from \$52,500,000 to \$101,000,000, a portion of the proceeds to be used for extensions and improvements.

The Litton Veneer Co. Rockford, Ill., will build a power house in connection with its new mill at Springfield, Mo., where a site has been purchased on Nettleton Street.

The Phillips Higrade Refining Co., Okmulgee, Okla., will make extensions and improvements at its refinery, to include a new power house to double the present capacity, one-story machine shop, one-story pumping plant, tank houses and other work, estimated to cost \$500,000, with equipment.

The Pacific Coast

SAN FRANCISCO, Nov. 27.

P LANS are under way by the Union Pacific Railroad Co., Chicago, for the construction of new locomotive and car shops at Los Angeles, to cost close to \$1,500,000 including equipment.

The Dinuba Planing Mill, Dinuba, Cal., has acquired a site on West Tulare Street for a new one-story plant to cost \$75,000, including machinery.

The Emergency Fleet Corporation, Washington, has rejected the single bid of \$405,000 received for the purchase of the Liberty Shipbuilding Co. plant, Alameda, Cal., Nov. 14, and will readvertise the property. The plant cost \$2,500,000 during the war.

The Nevada-California Electric Corporation, Symes Build-

ing, Denver, Col., has arranged for a bond issue of \$1,500,000, a portion of the proceeds to be used for extensions and improvements. E. S. Kassler is president.

The Corcoran Union High School District, Corcoran, Cal., has completed plans for a one-story vocational training shop at the school.

The Sespe Light & Power Co., Los Angeles, has tentative plans for a new hydroelectric power plant on the Sespe Creek, Ventura County, with initial capacity of 47,000 hp., estimated to cost \$5,000,000.

The Oregon Pulp & Paper Co., Salem, Ore., has awarded contract to Van Patten & Son, Salem, for a four-story addition to cost \$50,000, exclusive of machinery.

The W. M. Murphy Motors Co., 1919 Calaveras Street, Fresno, Cal., will build a one-story machine and mechanical shop on Van Ness Avenue, 45 x 88 ft. and 20 x 40 ft.

The Brewer-Cranston Box Co., Spokane, Wash., is arranging to rebuild its plant, recently destroyed by fire, estimated to cost \$35,000. A list of machinery will soon be prepared. O. Z. Brewer is manager.

The Coast Power Co., Tillamook, Ore., has plans nearing completion for a new power plant to cost \$150,000, including equipment.

The Hawley Pulp & Paper Co., Oregon City, Ore., has plans under way for enlargements in its plant to cost approximately \$1,500,000, including additional machinery. W. F. Hawley, Sr., is president.

The Yuba Development Co., 1213 Hobart Building, San Francisco, has tentative plans for a new hydroelectric generating plant on the North Yuba River, with capacity of 19,900 hp., estimated to cost \$1,500,000.

The California Lock & Lift Co., San Francisco, has acquired property at 165 Thirteenth Street, Oakland, Cal., improved with a two-story building, and will occupy the structure at once.

The San Joaquin Light & Power Corporation, Fresno, Cal., has plans for extensions and improvements in its plant and system in the vicinity of McKittrick and Santa Maria to cost \$500,000.

The Monolith Portland Cement Co., Monolith, Cal., will make extensions and improvements to increase the capacity to 2000 bbl. per day.

Canada

TORONTO, Dec. 4.

SALES of machinery and machine tools in November were equal to those of October and in some districts dealers report a slight increase. Inquiries and orders are coming from numerous sources and there is also a large amount of business in sight from industrial concerns which have announced their intention of building and improving plants in the early spring. Municipal and Provincial governments have extensive programs for the coming year and companies making equipment for electric and waterworks plants, etc., are looking forward to considerable activity in the new year. Small tools are also in active demand and dealers report a steady improvement in sales the past month.

The Thompson Motor Supplies, Ltd., which will erect a plant at Acton, Ont., to cost \$40,000, is interested in equipment. A. Harrison is connected with the company.

The Wilkie Products, Ltd., 312 Pitts Street, Tillsonburg, Ont., is preparing to erect a factory and is asking for machinery and metal working tools, etc.

The Arnprior Creamery Co., Arnprior, Ont., will erect a cold storage plant and will purchase equipment and boilers. E. McKinny is purchasing agent.

Silverwoods, Ltd., London, Ont., is interested in equipment for a cold storage plant, etc. A. E. Sherwood is manager.

The Sydenham Brick & Tile Co., Wallaceburg, Ont., is asking for drying and conveying machinery.

The Skinner Brothers Mfg. Co., Inc., St. Louis, Mo., manufacturer of Baetz patent heaters will establish a plant in Canada to take care of Canadian and foreign business. No statement regarding a site has been made.

The Aleza Lake Sawmill Co., Prince George, B.C., will build a sawmill to cost \$20,000 and is interested in equipment.

Jobbin & Genois, 113 Abraham Hill, Quebec, Que., will erect a marble plant at Riviere a Pierre, Que., to cost \$25,000.

Cutten & Foster, 302 Church Street, Toronto, makers of

auto tops, etc., will build an addition to cost about \$50,000. William F. Sparling & Co., 54 University Avenue, Toronto, are architects.

The Howard Furnace Co., 881 Yonge Street, Toronto, will call for bids for the erection of a factory to cost \$24,000. H. J. Chown, 20 Wayland Avenue, Toronto, is architect.

James Carnwath, 502 Harbor Commissioner Building, Toronto, has the general contract for a factory to cost \$50,000 for the Independent Concrete Pipe Co., Harbor Commissioners Building.

The Shawinigan Water & Power Co., Ltd., Shawinigan Falls, Que., has started work on water power development on the River St. Maurice at Le Gres Falls, Que., to cost \$1,500,000. C. R. Lindsay is resident manager.

The Town Council, Souris, Prince Edward Island, proposes to erect an electric light and power plant to cost \$18,000. C. C. Carlton is clerk.

Joseph Crane, 309 Esplanade East, North Vancouver, B. C., will construct new marine ways and erect a ship repair machine shop to cost \$40,000.

STEEL AND INDUSTRIAL STOCKS

Higher Levels at Close of Week—Not Justified by Business Conditions

Coming out from under the severe pressure sustained on Monday, steel and industrial stocks finished the week with a bullish demonstration in striking contrast to the violent selling movement which dominated the previous Saturday. Extravagance of the sort which ruled the market on the upside speculation in October was recurrent in the recent drastic decline; speculation of late has been as it was then—inordinately out of proportion to the scope of the business swing. The early decline broke on Tuesday. The bullish tendency then prevailed to the eve of Thanksgiving, indicating that the decline was initiated by speculative forces making the most of the unpalatable news. Crucible, Gulf States Steel and like stocks were run up sharply on Friday by a drive against over-extended short interests. Speculative banter over a rumored merger with Republic pushed Wickwire-Spencer up two points. International Harvester fell nine points at the close as the result of failure to pay dividends on its common. The average of 20 industrials remains at 94.10.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalm.	41	43½	Lackawanna Steel.	75	77
Am. B. S. & Fdry. 68	75		Lima Loco.....	52½	56½
Am. B. S. & F. pf.111	111		Midvale Steel.....	28	30
American Can....	67½	72½	Nat.-Acme	11½	12½
American Can pf..109	111		Nat. E. & Stm.....	60¼	65½
Am. Car & Fdry..175	184		Nat. E. & Stm. pf.	98	98
Am. Car & F. pf..122½	122½		N. Y. Air Brake..	24½	28½
Am. Locomotive..115¼	121½		Otis Steel.....	6	8½
Am. Locomot'e pf.120	121		Otis Steel pf.....	40	40½
Am. Radiator.....	111½	118	Pittsburgh Stl. pf.	92	92½
Am. Steel Fdries..	42	44½	Pressed Stl. Car..	75	78½
Baldwin Loco.....	113½	119½	Pressed Stl. pf....	99	100
Baldwin Loco. pf.116¼	117		Ry. Steel Spring..	108	111
Bethlehem Steel..	59½	62½	Ry. Stl. Spring pf.	118	118
Beth. Stl. Cl. B....	59½	63½	Replogle Steel.....	21	26
Beth. Stl. 8% pf..106	110		Republic	43½	47
Brier Hill.....	14	14½	Republic pf.....	83	85
Br. Em. S. 2d pf..	26¼	26½	Sloss	37½	38
Chic. Pneum. Tool..	80¼	81½	Steel of Canada..	57	58½
Colorado Fuel....	24½	26½	Superior Steel....	28½	28½
Crucible Steel....	58½	65	Transue-Williams.	32	32
Crucible Steel pf..	90	91	Un. Alloy Steel...	37	37
Deere, pf.....	72	72½	U. S. Pipe.....	23	26
General Electric..	174	183	U. S. Pipe pf.....	59¼	60
Gt. No. Ore Cert..	29¼	31	U. S. Steel.....	99½	103½
Gulf States Steel..	68	76½	U. S. Steel pf....	120½	121½
Inland Steel.....	46	47	Vanadium Steel..	30½	35½
Int. Har.....	91	104½	Va. I. C. & Coke..	55	55
Int. Har. pf.....	117	117½	W'house Air Br..	93	99

Industrial Finance

E. G. Kirby, Toledo, Ohio, has been appointed receiver of the Gram-Bernstein Motor Truck Co., Lima, Ohio, in proceedings brought in the Federal Court. Operations of the plant will be continued and steps are being taken to effect a reorganization.

The Keystone Steel & Wire Co., Peoria, Ill., showed a net gain to surplus of \$29,539 for the fiscal year ended June, 1922, as against a deficit of \$541,073 for the previous year.

The Twin Ports Steel & Machinery Co., Superior, Wis., has filed a voluntary petition in bankruptcy, admitting liabilities of \$71,303 and claiming assets of \$55,929. The concern for many years conducted a foundry and machine shop at 126-136 Hughitt Avenue, Superior.

An involuntary petition in bankruptcy has been filed

against the Oshkosh Tractor Co., of Oshkosh, Wis., manufacturer of tractors and gas engines. Miss Alma Barry, attorney-at-law, 425 East Water Street, Milwaukee, has been appointed receiver.

The Bangor & Aroostook Railroad Co., Bangor, Me., has asked authority from the Interstate Commerce Commission to issue \$250,000 equipment trust certificates. The company proposes to purchase 200 new freight cars with funds derived from the sale of the certificates and other resources at its disposal.

Notice has been filed with the secretary of Connecticut that the Norwalk Iron Works Co., Norwalk, Conn., has dissolved and all claims have been settled.

The income account of the Vulcan Detinning Co. for the September quarter gives sales as \$392,311, whereas for the corresponding period last year they were \$321,445, or \$70,866 smaller. Net profits for the quarter amounted to \$43,672, as against \$16,365 last year, an increase of \$27,307.

President Llewellyn of the Interstate Iron & Steel Co. reports gross earnings for the first 10 months of \$1,101,237. Gross profits after depreciation, taxes, etc., were \$437,104, and net profits after bond interest and other deductions were \$112,083. The year's total tonnage will approach the largest for the last five years.

The Guy Steel Casting Co., Elmwood, Conn., is to go out of business. Claims may be sent to George B. Kinghorn, 776 New Britain Avenue, Hartford, Conn.

A special stockholders' meeting of the American Screw Co. has been called for Dec. 1, for the purpose of authorizing the directors to declare a 50 per cent stock dividend. The company has \$3,000,000 stock outstanding, while at the close of 1921, its surplus account stood at \$2,962,373. The company is paying at the rate of 7 per cent per annum, but in January, last, an extra disbursement of 1 per cent was declared.

Letters are going out to stockholders of the Lackawanna Steel Co. urging that stock certificates be sent in for conversion into Bethlehem Steel Corporation securities. These letters point out that unless the stock certificates, properly indorsed, are surrendered to the transfer agent, Kean, Taylor & Co., New York, Bethlehem securities and cash cannot be mailed to the original Lackawanna stockholders, nor can dividends lately declared on Bethlehem securities be distributed. Approximately 75,000 shares of Lackawanna Steel Co. common stock, or 21 per cent of the 351,085 outstanding at the time of the merger, have not been surrendered for conversion.

The Biggs-Watterson Co., Cleveland, dealer in new and second-hand machinery, has made an assignment.

The Mansfield, Ohio, plant of the Browning-Somers-Adams Co. has been sold at auction to B. F. Miles, Cleveland, for \$125,000.

The H. J. Walker Co., Cleveland, manufacturer of motors, has been placed under a receivership in the Federal court. The company was affiliated with the Grant Motor Co. which recently went into a receivership. Joseph C. Hostetler was named as receiver.

The Interstate Iron & Steel Co., Chicago, showed gross earnings of \$1,101,237, during the first 10 months of this year. After providing the usual reserves for depreciation, taxes, etc., of \$664,137, there was left a gross profit of \$437,100. After bond interest and other deductions, the net profit was \$112,083.

The Michigan Trust Co., Grand Rapids, Mich., has qualified as receiver for the Muskegon Castings Co., Muskegon, Mich., under \$25,000 bond. The company is considered solvent, but was embarrassed for working capital, and it is expected that business will be continued under the receivership.

The Holland Furnace Co., Holland, Mich., will increase its capital stock from \$1,800,000 to \$3,600,000, of which \$2,000,000 will be common stock.

Reorganization plans having failed, the property of the Union Motor Truck Co., Bay City, Mich., will be sold at bankruptcy sale Dec. 12.

Large English Cutlery Company Fails

The Sheffield Steel Products, Ltd., a leading English cutlery company, is in financial difficulties, according to advices reaching Washington. The company was an amalgamation of a number of enterprises engaged in manufacturing cutlery, surgical instruments, pliers, corkscrews and related products. At the end of 1920 it was said to be the largest manufacturer of table cutlery in the world, the authorized capital being £4,000,000. Recently the company launched a chain store venture, which is said to have been unsuccessful and to have been one of the causes leading up to the financial collapse. A receiver has been appointed to continue the business and a reorganization will probably take place.

Suit for Receiver for Wagner Electric Mfg. Co.

Suit for a receiver of the Wagner Electric Mfg. Co., a Missouri corporation, has been filed in the Circuit Court at St. Louis by representatives of the estate of Richard C. Kerens, John J. Raleigh and Jane M. Leahy. An injunction to prevent reorganization under the laws of Delaware also was asked; plaintiffs who own about 1600 shares of stock of the Missouri corporation alleged that such reorganization would make their stock valueless.

A restraining order also was asked against the officers and directors holding a meeting of stockholders, Dec. 29, called to vote on a plan to reduce the capital stock of the company and of having the stockholders ratify the transfer of the assets to the Delaware corporation.

A temporary restraining order was issued by Judge Hall, returnable Dec. 8.

The company was reorganized and has been functioning since Aug. 11 as the Wagner Electric Corporation, a Delaware corporation. This reorganization is said to have been ratified at a meeting Aug. 4. W. A. Layman, president, said that 93 per cent of the stockholders of the Missouri corporation had exchanged their stock for stock in the Delaware corporation and were satisfied with the reorganization.

Plans of New Companies

The Fourchime Auto Whistle Co., Clinton, N. J., which has been incorporated with a capital stock of \$50,000, to manufacture automobile equipment and kindred metal products, is receiving bids on screw machine work. It is in the market for a nickel plating outfit. In connection with its activities the company will do stamping work on a jobbing basis. The incorporators are: Roland J. Hines, J. H. Knox, Jr., and L. Duckworth.

The Commercial Iron Works, Inc., Portland, Ore., was recently incorporated with a capital of \$100,000 to manufacture iron and steel products, castings, etc. Properties have been acquired and buildings are equipped for operation. The company is represented by John M. Joyce, 606 Concord Building, Portland.

The Production Machinery Co., corner Main and Horton Streets, Jackson, Mich., originally organized as a sales company, was recently incorporated with authorized capital of \$100,000 to manufacture iron and metal working machinery. The company has equipped a modern shop to which extensions have been added from time to time to keep in pace with the demand for vertical lathes and boring mills. Since incorporating, plans have been made to add to the equipment in order to produce on a still larger scale. D. E. Murray is secretary-treasurer.

The McLain Co., Portland, Me., has been incorporated with a capital of 1350 shares of stock, no par value, to manufacture metal-working tools and machinery. Immediate plans provide for building wood-working machines with present shop facilities, but a factory will be erected in the spring and manufacturing will be extended. At that time the company will be in the market for equipment. Frank H. McLain is president and Clark B. Dunton is treasurer, both of Portland.

The Katchen & Shaw Iron Works, Inc., Newark, N. J., will operate a general steel and iron working plant, including the manufacture of structural ironwork. William and Alexander Katchen and Saul Shaw have incorporated the company with an authorized capital of \$18,000. The present address of the company is care of J. H. Steinhardt, 31 Clinton Street, Newark.

The Athey Truss Wheel Co., 17 North LaSalle Street, Chicago, which was recently incorporated to manufacture tractors and kindred steel products, is now producing in its own plant. The officers of the company are: A. D. Plamondon, president; J. H. Roberts and I. H. Athey, vice-presidents; and J. A. Roberts, secretary-treasurer. The company's works are located at 5631 West Sixty-fifth Street, Chicago.

The Associated Radio Manufacturers, Inc., which was recently organized to manufacture radio apparatus and equipment, will not begin operations in the immediate future. Ralph C. Watrous, Commodore Hotel, New York, is secretary.

A company organized to manufacture automotive equipment, the chief product of which will be a disappearing luggage carrier invented by M. J. Lantier, has been incorporated with a capital stock of \$150,000. Manufacturing will be let out on contract. The men in back of this enterprise include: H. W. Nuckols, formerly president of the Packard Motor Car Co. and the Maxwell Co.; William T. Koch, proprietor of Koch chain stores, and R. H. Woodward, Jr., of Merrill, Lynch & Co. A. H. Johnson, formerly of the General Motors Co., is engineer, and John M. Gibbons, 3841 Grand Central Terminal, New York, general attorney for the New York.

New Haven & Hartford Railroad Co., is counsel for the company, which will be known as the Latier Automotive Equipment Co. Thorpe W. Wright has been appointed general manager.

The American-Ukrainian Agricultural Corporation, 321 Broadway, New York, was recently incorporated with a capital of \$75,000 to manufacture agricultural equipment, tractors, etc. The company is still in the process of organization and is looking for a place to begin operation. The incorporators are: J. Glassman, S. J. Finkler and P. D. Mucha.

The Neptune Air Craft Corporation, 233 Broadway, New York, has been incorporated with a capital stock of \$100,000 to manufacture airplanes and parts. The company, it is understood, has taken over certain properties which will require considerable readjustment before they can be converted to this particular line of manufacture. The incorporators are: A. Bickel, W. Hutchinson and B. M. Bancroft. Counsel for the company is Henry Amermann, Woolworth Building, New York.

The Plastuck Mfg. Co., 205 Sunset Avenue, Syracuse, N. Y., has been incorporated with a capital stock of \$300,000 and will engage in the manufacture of sheet lathing and kindred products. The future of the company is still undecided pending a meeting of the incorporators which will be held in the near future. S. J. Potter and F. S. Hutchinson are the chief incorporators. Counsel for the company is Warren B. Hutchinson, 75 Maiden Lane, New York.

The Severin-Tripp Machinery Co., 25 Church Street, New York, has been organized by Fred C. Severin, formerly with the Niles-Bement-Pond Co., and B. H. Tripp, for many years with the Chicago Pneumatic Tool Co., to supply the growing demand for new and used tools and equipment suitable for railroads. Mr. Severin will have charge of the New York office and Mr. Tripp will manage the Philadelphia office at 2220-2222 Chestnut Street.

Trade Changes

Roger J. Adams & Co., Inc., Newark, N. J., is making arrangements for opening a branch office in Los Angeles, Cal., about Jan. 1. Its activities will include the sale of contractors' machinery and building material, but it will also represent several large eastern construction companies.

The Rockford Milling Machine Co., Rockford, Ill., announces the following changes in agencies: J. C. Austerberry, Detroit, will represent the company in the Michigan territory; the Co-operative Machinery Co., Cleveland, will be exclusive agent in that district, and the Western Iron Stores Co., Milwaukee, will be exclusive representative of this company and of the Rockford Tool Co. in Wisconsin territory.

The manufacture and sale of the Loy & Nawrath line of power brakes, shears and kindred products has been taken over by the Birmingham Iron Foundry, Derby, Conn. This business formerly conducted by the Loy & Nawrath Co. of Newark, N. J., will be handled by the Loy & Nawrath Division of the Birmingham Iron Foundry and all correspondence and business will be centered at the Derby office. Increased facilities are provided by the new arrangement.

The B. L. Schmidt Co., Davenport, Iowa, has changed its name to the Micro Machine Co., and has moved into its new factory building. The company will center its attention exclusively on the manufacture of the Micro wet internal grinding machine for automotive cylinder refinishing.

The Goetzke Gasket & Packing Co., New Brunswick, N. J., has moved its New York branch from 242 Lafayette Street to the Hudson Terminal Building, 50 Church Street, where the company has secured the services of King & Shepard as sales representatives in the metropolitan district.

The Power Specialty Co., builder of Foster superheaters, economizers, and oil heating and cooling equipment, announces the opening of a branch office at Dime Savings Bank Building, Detroit, in charge of L. Lanyi. Another has been opened at 2324 Fourteenth Street, Boulder, Col., in charge of R. B. Nutting, who was formerly Chicago district manager.

The Roller-Smith Co., electrical instruments and radio appliances, 233 Broadway, New York, announces the appointment of the Electric Material Co. as agent in Washington and parts of Oregon and Idaho. The Electric Material Co. recently opened an office in the Hinkley Building, Seattle. R. F. Robinson, who has had nearly 20 years' electrical experience, is in charge.

Plant and equipment of the Gibb Instrument Co., Detroit, manufacturer of electric welding equipment, have been moved to Ray City, Mich. In the new location manufacturing facilities are provided to cope with the increased business. During the past two years the company has concentrated on the development of automatic and semi-automatic arc, spot and seam welders.

The V & O Press Co., designer and manufacturer of power

presses and sheet metal working machinery, Brooklyn, N. Y., has appointed L. F. Carlton as western sales manager, with offices at 549 Washington Boulevard, Chicago. Mr. Carlton was connected with the Consolidated Press Co. for 18 years and has a wide acquaintance among power press users.

Effective Dec. 1, the R. H. Madden Co., Inc., will succeed the Madden & Morrison File Co. in the management of the Madden File Works, which has been conducted in Middletown, N. Y., since 1857. Madden files and rasps will continue to be the main product of this company. The officers are: R. H. Madden, president; Z. Edward VanFleet, vice-president; Charles W. Moore, secretary and treasurer.

The Wilson Welder & Metals Co., Inc., 132 King Street, New York, announces the appointment of the Alexander Milburn Co., Baltimore, Md., as exclusive representative in Maryland, Virginia and District of Columbia. The Milburn company will maintain a complete demonstration plant.

M. F. Day, Jr., for the past 11 years with Hickman, Williams & Co., Inc., in its Philadelphia, St. Louis and Pittsburgh offices, has gone into business for himself with temporary offices at 936 Mellon Street, Pittsburgh, and will do a general brokerage business in pig iron, coke and coal.

The business of the New Haven Sherardizing Co. will be moved to Akron, Ohio, where it will occupy quarters at 917 Sweitzer Avenue. A. F. Shoen is general manager.

On or about Dec. 1, W. H. J. Fitzgerald & Co., 165 High Street Boston, machine tools, will remove to 261 Franklin Street. At about the same time, the company will open a warehouse in Chelsea.

The American Brass Co., Waterbury, Conn., plans to consolidate much of the clerical work now done at its Ansonia and Torrington branches with the Waterbury office. For this purpose an addition to the main office building at Waterbury will be erected at once.

The Branford Brass Foundry Co., Inc., Branford, Conn., recently incorporated under the laws of Connecticut, to engage in the brass foundry business, organized the past week by the election of the following officers: President, Hugh A. Cox; secretary, Frederick A. Ellis, and treasurer, Robert L. Rosenthal.

BUYING DEFERRED

Prevailing Opinion at Youngstown, However, Is That Good Business Is Coming

YOUNGSTOWN, Dec. 5.—While buying in such lines as sheets, plates, strips and sheet bars has temporarily moderated, steel makers express no apprehension over this condition which is attributable in part to inventory taking. Producers believe there is a substantial overhanging demand in the market, which is being held back by price uncertainties.

Makers here profess to believe that the market will settle around current quotations, though efforts to break down prevailing minimums are noted. There is a question, for instance, as to the stability of the present 3.35c. minimum on black sheets, and indications that some makers will go lower to fill out their rolling schedules.

Considerable irregularity exists in demand for sheets, especially the common grades. Makers of highly finished sheets are booking business for next quarter delivery on the present 5c. per lb. basis, though some tonnage has moved at 4.85c., or \$3 per ton less. There continues to be sustained requirement for full finished stock, and broadened manufacturing programs of automobile interests for next year are expected to stimulate the whole steel list entering into motor car manufacture.

In the pig iron market, it is declared that prospects of another coal strike next April are already beginning to be a factor in the price situation. While the market on standard basic material is nominal at \$27.50, transactions are reported at least \$1 per ton lower. There is much uncertainty in the minds of consumers as to whether or not the bottom has been reached in the pig iron market.

Indicating the depleted state of foundry iron stocks is the demand at this season of the year, when requirements usually fall away sharply. In the Youngstown district, 32 of 47 blast furnaces are pouring, but most of the output is consumed by the makers in their steel-works departments.

Scrap buying is light and prices show little change, with heavy melting scrap pegged at \$21.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.04c.
Swedish bars, base price	7.50c.
Soft steel bars, base price	3.04c.
Hoops, base price	4.39c.
Bands, base price	3.84c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base	3.14c.
Channels, angles and tees under 3 in. x ¼ in., base	3.04c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.10c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	3.30c.
Toe-calk, ½ x ¾ in. and larger	4.15c.
Cold-rolled strip, soft and quarter hard ..	7.25c.
Open-hearth spring steel	4.00c. to 6.00c.
Shafting and Screw Stock:	
Rounds	3.90c.
Squares, flats and hex	4.40c.
Standard cast steel, base price	15.00c.
Extra cast steel	18.00c.
Special cast steel	23.00c.

Tank Plates—Steel

¾ in. and heavier	3.14c.
-------------------------	--------

Sheets

Blue Annealed

	Per Lb.
No. 10	4.19c.
No. 12	4.24c.
No. 14	4.29c.
No. 16	4.39c.

Box Annealed—Black

	Soft Steel C. R. One Pass, Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.30c. to 4.55c.	.....
Nos. 22 and 24	4.35c. to 4.60c.	5.00c.
No. 26	4.40c. to 4.65c.	5.05c.
No. 28	4.50c. to 4.75c.	5.15c.
No. 30	4.75c. to 5.00c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	4.60c.
No. 16	4.75c.
Nos. 18 and 20	4.90c.
Nos. 22 and 24	5.05c.
No. 26	5.20c.
No. 27	5.35c.
No. 28	5.50c.
No. 30	6.00c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel

	Black	Galv.
½ in. Butt... —50	—42	
¾ in. Butt... —55	—44	
1-3 in. Butt... —57	—44	
2½-6 in. Lap... —54	—41	
¾ in. Lap ... —50	—26	
9-12 in. Lap.. —46	—25	

Wrought Iron

	Black	Galv.
½ in. Butt... —11	+13	
¾ in. Butt... —17	—1	
1-1½ in. Butt... —20	—2	
2 in. Lap ... —14	+2	
2½-6 in. Lap... —18	—2	
7-12 in. Lap.. —10	+6	

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic	4.75c. to 5.00c.
Annealed soft	4.75c. to 5.00c.
Galvanized annealed	5.40c. to 5.65c.
Coppered basic	5.40c. to 5.65c.
Tinned soft Bessemer	6.40c. to 6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	19½c. to 20½c.
High brass wire	20 c. to 21 c.
Brass rod	17 c. to 18 c.
Brass tube, brazed	26½c. to 27½c.
Brass tube, seamless	23 c. to 23½c.
Copper tube, seamless	25½c. to 26 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22c. to 23c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
			80 lb..	\$5.80	\$5.55
			90 lb..	5.90	5.65
			100 lb..	6.00	5.75
	IC..	\$10.00	IC..	6.15	5.90
	IX..	11.50	IX..	7.15	6.90
	IXX..	13.00	IXX..	8.15	7.90
	IXXX..	14.25	IXXX..	9.15	8.90
	IXXXX..	16.00	IXXXX..	10.15	9.90

Terne Plates

8-lb. coating, 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits pig	39c.
Bar	45c. to 50c.

Copper

Lake ingot	15½c.
Electrolytic	15 c.
Casting	14½c.

Spelter and Sheet Zinc

Western spelter	8½c.
Sheet zinc, No. 9 base, casks	10½c. open 10½c.

Lead and Solder*

American pig lead	8c. to 8½c.
Bar lead	9c. to 10c.
Solder, ½ and ½ guaranteed	27½c.
No. 1 solder	26c.
Refined solder	23½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	7½c. to 8½c.
---------------	--------------

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.
--	--------------

Old Metals

The market is sluggish but business continues fair. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	12.00
Copper, heavy wire	11.50
Copper, light and bottoms	9.50
Brass, heavy	6.50
Brass, light	5.50
Heavy machine composition	8.75
No. 1 yellow brass turnings	7.00
No. 1 red brass or composition turnings	8.00
Lead, heavy	5.75
Lead, tea	4.50
Zinc	4.50

EST

TH
of the
long li
those



to be nee
pockets
tween th
not to be
The S
product
sensitive
work for
company
much oil
accuracy
large wor
squeeze o